

2018 Syllabus for Biology 221: Ecology

Monday/Wednesday 8:00am–9:40am

101 Integrated Science Center

Instructor: Dr. Althea A. ArchMiller

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Office Hours: Mon/Wed 10:30-11:00 & T/Th 10:30-12:00

The schedules and policies associated with this course may be subject to revision or change as a consequence of changing circumstances or events. Reasonable notification will be provided to students prior to any major changes in course policies or procedures.

Course Description

Covers the basic principles of energy and nutrient movement through the ecosystems, the forces that structure ecosystems, and the interactions between organisms and the environment and each other. This course emphasizes quantitative skills. Two lectures and four hours of laboratory per week.

Course Goals

The primary objective of this course is to provide a basis for your understanding of ecology, which includes the complex interactions between organisms and their environment. You will learn to draw together elements from biology, chemistry, physics, geology, and mathematics to gain a greater understanding of ecological relationships in the natural world. The goals of the course are to:

1. Discuss classical and current ecological issues and methodology
2. Address natural diversity and how humans interact with the environment
3. Examine biodiversity and sustainability of natural systems
4. Explore the benefits and limitations of scientific efforts to understand ecological relationships
5. Critically evaluate environmental issues locally, regionally, and globally
6. Practice communicating your ecological and scientific knowledge in meaningful and effective ways

Learning Outcomes

1. Access, critically evaluate, and correctly use scientific literature
2. Classify organizational levels observed in ecology
3. Explain how populations are regulated and how data can be collected, analyzed, and interpreted using statistics, life tables, graphs, and survivorship curves
4. Describe the interactions between different species and how they impact one another
5. Illustrate the major forces responsible for community structure, how community structure can be represented by food webs, and how communities change in both space and time
6. Discuss patterns and measurements of biodiversity and predict the consequences of continued species loss
7. Communicate your interpretations, questions, and critiques of the readings with your colleagues during Moodle group discussions

Required Textbooks

- SimUText Ecology
- Carrol, S.B. 2016. *The Serengeti Rules*. Princeton University Press, Princeton. 263pp.
- Pollan, M. 2006 *The Omnivore's Dilemma*. Penguin Press, New York. 451pp.
- Leopold, A. 1987. *A Sand County Almanac*. Oxford University Press, New York. 228pp.
- McMillan, V.E. 2012. *Writing Papers in the Biological Sciences*. 5th ed. New York: Bedford/St. Martin's

Attendance Policy

Regular attendance and participation in class is critical to your success at Concordia College. Because any absence, excused or unexcused, detracts from the learning experience, you are expected to attend all classes. Dr. ArchMiller also values the educational experience afforded by student participation in co-curricular activities; however, you are responsible for notifying Dr. ArchMiller of scheduled absences (e.g., co-curricular activities) at the beginning of the semester, or as soon as that information is available (but no less than 24 hours in advance).

If absences become what Dr. ArchMiller determines to be excessive (from 10-15% of classes, without valid college-recognized excuses), points will be deducted from your final percentage. In extreme cases (> 20% of classes or 6 unexcused absences), Dr. ArchMiller will assign a failing grade. **I strongly recommend that you are present and participate in the class.**

PARTICIPATION in class and lab will not go towards your grade directly. However, a record throughout the semester of exemplary participation and attendance can help in the case of a borderline final grade. Active participation also nurtures learning, and will improve the quality of future recommendation letters from your instructors.

Accommodations for Students with Disabilities

In accordance with the Americans with Disabilities Act, Concordia College and your instructor are committed to making reasonable accommodations to assist individuals with documented disabilities to reach their academic potential. Such disabilities include, but are not limited to, learning or psychological disabilities, or impairments to health, hearing, sight, or mobility. If you believe you require accommodations for a disability that may impact your performance in this course, you must schedule an appointment with Disability Services to determine eligibility. Students are then responsible for giving instructors a letter from Disability Services indicating the type of accommodation to be provided; please note that accommodations will not be retroactive. The Disability Services office is in Academy 106, phone 218-299-3514; <https://www.concordiacollege.edu/directories/offices-services/counseling-center-and-disabilityservices/disability/>

Respect for Diversity

It is my intent that students from diverse backgrounds and perspectives be well-served by this course, and that the diversity that students bring to this class be viewed as a resource. Please let me know ways to improve the effectiveness of the course for you, personally, or for other students or student groups. As a student in this class, you are required to treat other members of the class with respect and kindness. Disrespectful, rude, or exclusive behavior will not be tolerated.

Grades

Category	Item	Details	%
SimUText Readings	Reading Completion	Pass/Fail for each assignment	5
	Graded Questions	2 lowest scores dropped	5
Exams & Quizzes	Quizzes	2 lowest scores dropped*	10
	Exam 1	Oct. 10; Unit 1 material	10
	Exam 2	Nov. 14; Unit 2 material	10
	Final Exam	Dec. 17; 66% Unit 3; 34% Units 1&2	15
Discussions & Paper	Group Discussions	Participate through Moodle	10
	Symposium Paper	Due Sept. 26	5
Laboratory		<i>see laboratory syllabus</i>	30
			Total 100

SIMUTEXT READINGS are from the interactive textbook for this class, and each module has integrated, feedback-focused questions followed by a series of graded questions. **SimUText readings are due by 8:00am on the due date (see schedule).**

Reading Completion will be evaluated with the feedback-focused, ungraded questions and will be assessed with a pass-fail grade (completed or not) for each SimUText assignment.

Graded Questions will be worth another 5% of your final grade; however, the two lowest scores will be dropped before final grades are completed. You may work through the SimUText material with your peers; however, mastering the material is your individual responsibility.

Percentage	Grade
≥ 94	A
90-93.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
60-66.9	D
< 60	F

QUIZZES are designed to quickly check for reading and comprehension of that lecture date's SimUText material. Quizzes will be short (~3 questions) and given at the beginning of class time on most days. I will drop the two lowest quiz scores.

*In addition, I will make homework available for students that have excused absences. If you have an excused absence (thus a 0 for that quiz), you may—up to 3 times over the course of the semester—complete homework to replace a zero quiz score. The homework assignments will be designed to give you more hands-on practice with quantitative topics covered in lecture and in the SimUText readings; however, they will be more difficult than quizzes.

LECTURE EXAMS will be of variable format, including—but not limited to—multiple choice, true/false, matching, short answer, and brief essays. All exams will be somewhat cumulative but will primarily focus on the associated SimUText Unit material (see table above); in addition, the final exam will be one-third cumulative.

GROUP DISCUSSIONS allow you to work as a team of scientists with your colleagues to critically discuss three separate books, *The Serengeti Rules*, *The Omnivore's Dilemma*, and *A Sand County Almanac*. Group discussions will occur in forum format on Moodle. Groups will be assigned at random and will be reassigned for each new book (i.e., by October 19 and November 9). You will be graded based on the quantity, quality and timing of your comments (see grading rubric below). Each discussion is worth a total of 5 points.

The group as a whole is responsible for completing the assignment; in this case providing a good discussion and coming to a better understanding of ecology and evolution. Everyone should contribute to the discussion, and you are expected to provide at least two comments; ideally one will be an original question or discussion point, and one will be a reply to another group member's comment. You should take this opportunity to learn from and respectfully teach each other.

Grading Criteria	Exemplary	Adequate	Poor
Quantity of Comments	>2 Comments (2pts)	2 Comments (1.5pts)	1 Comment (1pt)
Quality of Comments	Focused on ecological aspects and tackled central themes of reading (2pts)	Indicated a superficial understanding of reading or focused on details w/o conveying importance to ecology or main themes of text (1.5pts)	Conveyed little understanding of reading; not relevant to ecology or main themes of text (1pt)
Timing of 1 st Comment	>48 hrs before noon (1pt)	24–48 hrs before noon (0.5pt)	<24 hrs before noon (0pts)

THE SYMPOSIUM PAPER is a 3-page, 1.5-spaced, 12-pt font paper, that is due at 11:55pm on Wednesday, September 26 (upload on Moodle). The 2018 Symposium, *Power Plays: Why Gender Matters*, takes place on September 18–19, and you are required to attend. The Symposium Paper should name and summarize the session you attended, including questions/answers raised during the Q/A of the session, and your reaction. At least one page of your paper should explore how the symposia relate to ecology, the environment and campus life. You will be graded out of 100 points based on the following (detailed rubric is on Moodle):

- Spelling and grammar (20pts)
- Summary of session and Q/As (40pts)
- Relation of session topic to campus life and science (40pts)

Academic Integrity (from Student Handbook)

“The Concordia community expects all of our members to act with integrity—to act with honesty, uprightness and sincerity. Every member of our academic community is charged with the responsibility of encouraging and maintaining an environment of academic integrity.

“Academic misconduct is defined as any activity that comprises the academic integrity of the college or undermines the educational process. Academic misconduct includes but is not limited to:

- cheating: using a resource other than one’s own work to answer questions;
- plagiarism: misrepresenting another’s ideas as one’s own or not giving credit to the creator of a work;
- falsification: submitting falsified or fabricated information;
- facilitating others’ violations: knowingly permitting or facilitating the dishonesty of others;
- impeding: placing barriers in the way of others’ academic pursuits”

Concordia College has university-wide policies about academic integrity, and all students are responsible for being familiar with and adhering to them. These policies are in place to protect students, first and foremost. **My role as instructor is to teach each of my students how to become responsible scholars.** As a student at Concordia College and as a student in this class, you are expected to fully and properly acknowledge the work of others. Every instance of plagiarism will be reported, as per the policies of the college, but please do not hesitate to ask me in advance if you think something might be questionable or if you are unsure about what is considered to be plagiarism. I am happy to help, as long as you inquire in advance!

Biology Department policy on use of electronic devices (phones, smart watches, laptops, tablets, etc.)

Faculty in the Biology Department work to make the classroom and laboratory a space conducive to student learning. We encourage writing notes by hand because it is an effective learning strategy for many students. However, the Biology Department also understands the valuable role of electronic devices in learning and scholarship. Thus, the Biology Department policy on the use of these devices in the classroom is as follows:

1. Electronic devices used during class time should be limited to appropriate class-related activities as outlined by the instructor. We reserve the right to check devices at any time and to ask you to put them away or leave if we see you using them inappropriately. Please reduce distractions to yourself and your fellow classmates.
2. All electronic devices must be set to silent during scheduled classroom and laboratory sessions. Tones and vibrations are distracting.
3. Only approved electronic devices (such as non-programmable calculators) may be available or used during examination periods. We expect that all non-approved electronic devices will be turned off and stored away from the exam areas.
4. Sharing calculators during exams is not allowed without permission.
5. Cheating in any form, including through use of an electronic device, will not be tolerated. See the academic integrity policy for more information.

Inappropriate or distracting use of electronic devices in the classroom may adversely affect your course grade.

Course Schedule (version dated 7/24/2018)

- SimUText Sections: You are expected to come to class prepared by reading that lecture's associated SimUText Module. SimUText assignments are due at 8am unless otherwise noted. There will be quizzes on reading material at the beginning of lecture.
- GD: Group discussions on Moodle. You will be graded based on your participation and are expected to post to each discussion section at least twice by 5pm the day each discussion unit is due.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
<div>Sep 3rd</div> SimUText: Evolution for Ecology 1-3, Biogeography 3	4th	5th	6th	7th GD: The Serengeti Rules p1-46 (by 5pm)
10th Library Materials Lecture (<i>upload assignment on Lab Moodle page</i>)	11th	12th SimUText: Biogeography 4, Physiological Ecology 1	13th	14th GD: The Serengeti Rules p47-105 (by 5pm) Library Materials assignment due on Lab Moodle page by 11:59pm
17th SimUText: Physiological Ecology 2-4	18th	19th Symposium No office hours	20th	21st
24th SimUText: Ecosystem Ecology 1-3	25th	26th Symposium Paper due on Moodle by 11:55pm	27th	28th GD: The Serengeti Rules p107-168 (by 5pm)
<div>Oct 1st</div> SimUText: Climate Change 1-5	2nd	3rd	4th	5th GD: The Serengeti Rules p169-214 (by 5pm)
8th	9th	10th EXAM 1	11th	12th

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
15th SimUText: Nutrient Cycling 1-4	16th	17th	18th	19th GD: Omnivore's Dilemma p1-56 (by 5pm)
22nd <i>Mid Semester Break–No Class</i>	23rd <i>Mid Semester Break–No Class</i>	24th <i>Mid Semester Break–No Class</i>	25th <i>Mid Semester Break–No Class</i>	26th <i>Mid Semester Break–No Class</i>
29th SimUText: Life History 1-4	30th	31st	Nov 1st	2nd GD: Omnivore's Dilemma p65-99, p410-411 (5pm)
5th SimUText: Population Growth 1-3 In Class: Understanding Population Growth Models	6th	7th SimUText: Population Growth 4-5	8th	9th GD: Sand County Almanac pp vii–52 (by 5pm)
12th	13th	14th EXAM 2	15th	16th
19th SimUText: Biogeography 1-2	20th GD: Sand County Almanac p53–92 (by 5pm)	21st <i>Thanksgiving–No Class</i>	22nd <i>Thanksgiving–No Class</i>	23rd <i>Thanksgiving–No Class</i>
26th SimUText: Community Dynamics 1-2	27th	28th SimUText: Community Dynamics 3-5	29th	30th GD: Sand County Almanac p95-112; 129–137; 165–176 (by 5pm)
Dec 3rd SimUText: Competition 1-2	4th	5th SimUText: Competition 3-4	6th	7th GD: Sand County Almanac p188–226 (by 5pm)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
10th SimUText: Predation, Herbivory and Parasitism 1-2	11th	12th SimUText: Predation, Herbivory and Parasitism 3-4	13th	14th Special review 8:00-9:20am
17th FINAL EXAM 8:30-10:30am	18th	19th	20th	21st

2018 Syllabus for Biology 221: Ecology Lab

Monday 1:20pm–5:20pm; 251 ISC

Instructor: Dr. Althea A. ArchMiller

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Course Description & Goals

This field course will provide students with a foundation in ecological principles through hands-on work in the field. Students will develop their skills in framing scientific questions, arriving at testable hypotheses, and collecting, analyzing, and presenting data. After a brief introduction to the field, students will work in groups of 3–4 to select and develop their own group research projects. Research projects will be presented as scientific posters in a poster session at the end of the semester. Additional indoor laboratories will introduce students to modeling ecological processes, using data spreadsheets and applying statistics in ecology.

THE PRIMARY GOAL OF THIS COURSE is to enhance your understanding of ecology, which includes the complex interactions between organisms and their environment, through interactive, hands-on activities in the field and laboratory.

LEARNING OUTCOMES

1. Observe and identify organisms
2. Detect and interpret ecological interactions amongst organisms
3. Investigate the relationships between organisms and the environment
4. Accurately and effectively document field observations with field notes and data collection
5. Link field observations with key ecological concepts and relevant scientific literature
6. Execute the scientific method using reproducible research methods
7. Present scientific research results in the form of a scientific poster

REQUIRED TEXTBOOK: McMillan, V.E. 2012. *Writing Papers in the Biological Sciences*. 5th ed. New York: Bedford/St. Martin's.

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Open Science Framework (OSF)

Students in this lab are required to sign up for a free Open Science Framework (OSF) account at <https://osf.io/>

Attendance Policy

Attendance in labs is required. If you miss a lab, you are responsible for getting the material you missed. Dr. ArchMiller also values the educational experience afforded by student participation in co-curricular activities; however, you are responsible for notifying Dr. ArchMiller of scheduled absences (e.g., co-curricular activities) at the beginning of the semester, or as soon as that information is available (but no less than 24 hours in advance). You must make up any missed assignments either before your absence or before the next class meeting. Any work missed because of a valid, college-recognized emergency absence (accompanied by a written excuse) must be made up as soon as possible after your return. Assignments are due at the beginning of the class period unless otherwise specified. Late assignments will be penalized 10% per day.

MOST LABS WILL BE OFF-CAMPUS. Please arrive promptly for class and prepared for a walk *in all types of weather*. Please, bring the following items to each lab:

Sturdy shoes for walking	Rain gear	Hand lens (optional)
Sunscreen and/or sunhat	Calculator	Field guides (optional)
Water bottle	Pencil or waterproof pen	Field notebook (3-ring binder)

YOU ARE REQUIRED TO MAINTAIN FIELD NOTES each day that you are in the field. Field note forms will be provided for the first three labs. Please also bring a 3-ring binder for storing your notes and to write in during lab. Research-specific data sheets will be required for every day that you are in the field collecting data.

Participation

You will be working in groups, so participation—while it does not affect your grade directly—is essential to the quality of everyone's learning. Furthermore, a record throughout the semester of exemplary participation and attendance can help in the case of a borderline final grade. Active participation nurtures learning, and will improve the quality of future recommendation letters from your instructors.

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Grades

Category	Item	Details	Points	Total	%
Lab Assignments				50	17%
	Understanding Experimental Design	Due Sept 7	10		
	Library assignment	Due Sept 14	20		
	R Tutorials	Due Sept 24	10		
	Isle Royale: Graded Questions	Due Nov 9	10		
Datasheets				50	17%
	Guided Datasheet Wk 1	Due Sept 10	10		
	Guided Datasheet Wk 2	Due Sept 17	10		
	Guided Datasheet Wk 3	Due Sept 24	10		
	Blank Field Datasheet	Due Sept 24	5		
	Completed Field Datasheets	Due Oct 15	15		
Research Assignments				100	33%
	Draft Proposal	Due Sept 17	20		
	Final Proposal	Due Oct 1	30		
	Data Entry	Due Oct 14	5		
	Data Appendix	Due Nov 2	15		
	Results HTML	Due Nov 16	15		
	Peer Assessments	Due Nov 26	15		
Research Poster				100	33%
	Scientific Merit		50		
	Presentation & Format		50		
			Total	300	100%

Percentage	Grade
≥ 94	A
90-93.9	A-
87-89.9	B+
83-86.9	B
80-82.9	B-
77-79.9	C+
73-76.9	C
70-72.9	C-
67-69.9	D+
60-66.9	D
< 60	F

Course Schedule

Week	Topic(s)	Assignments and Due Dates
Week 1: Sept 3	Introduction to Long Lake Taking Good Field Notes Framing Research Questions	9/7 Experimental Design (SimUText)
Week 2: Sept 10	Long Lake Ecology Effects of Fire on Plant Communities Sampling and Identification in the Field	9/10 Form Research Groups (In lab check) 9/10 Week 1 Guided Datasheet 9/14 Library Assignment (Moodle)
Week 3: Sept 17	Introduction to Buffalo River Diversity of Benthic Macroinvertebrates Wet Sampling: Identification in the Field **Symposium Week**	9/17 Week 2 Guided Datasheet 9/17 Draft Proposal (Printed)
Week 4: Sept 24	Introduction to R & TIER Protocol	9/24 R Tutorials (In lab check) 9/24 Blank Field Datasheet (In lab check) 9/24 Week 3 Guided Datasheet
Week 5: Oct 1	Research Projects: Data Collection	10/1 Final Proposal (Printed w/Draft)
Week 6: Oct 8	Research Projects: Data Collection	
Week 7: Oct 15	Intro to Data Analysis & Making a Data Appendix	10/14 Data Entry (OSF) 10/15 Complete Field Datasheets (printed)
Week 8: Oct 22	Fall Break – No Lab	
Week 9: Oct 29	Registration Advising – No Formal Lab Groups meet with instructor by appt	11/2 Data Appendix (OSF)
Week 10: Nov 5	SimUText Ecobeaker Isle Royale: Predator Prey Dynamics	11/9 Isle Royale (SimUText)
Week 11: Nov 12	Data Analysis & Plotting	11/16 Results HTML (OSF)
Week 12: Nov 19	Thanksgiving Open Lab	
Week 13: Nov 26	Draft Poster Presentation	11/26 Poster Draft after lab (OSF) 11/26 Peer Assessments (in lab)
Week 14: Dec 3	Open Lab Work with Research Groups	12/7 Final Poster (OSF)
Week 15: Dec 10	No Lab Poster Session (ISC 325 Commons) Friday, December 14, 2:00-4:00pm	