

**FOUNDATIONS OF ECOLOGY
BI 595**

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MY COMMITMENT TO DIVERSITY AND INCLUSION: I want to acknowledge that we are on the ancestral homelands of the Anishinaabe Nation and that the Anishinaabe people are among the First Peoples of the Great Lakes. In addition, I believe the diversity all students bring to my classroom is a resource, strength, and benefit to our shared pursuit of scientific knowledge. My goal is that the learning needs of students from all backgrounds and perspectives will be well served in my classroom and that all students in my class are supportive and respectful of the diversity represented here: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, culture, immigration status and religion. Further, I believe that all people have the right to be addressed and referred to in accordance with their personal identity. As such, please let me know the name you prefer to be called as well as your preferred pronouns and I will do my best to refer to all students accordingly and support your fellow classmates in doing so as well. If my academic schedule conflicts with any of your religious events, let me know so that I can make arrangements for you to not miss out important activities and assignments. Please let me know if/how I can make you feel more welcome, valued and supported in our shared pursuit of conservation knowledge.

Sincerely, Dr. Lafferty

COURSE LEARNING OBJECTIVES

- **Student learning objectives, knowledge:** discuss the factual basis for and natural history of the field of ecology; discuss basic elements of major ecological theories, principles and hypotheses; identify important ecologists and their contributions to the field; discuss classical research in ecology and be able trace the development of these foundational initiatives to modern advances in ecological research and theory.
- **Student learning objectives, critical thinking:** analyze and discuss the primary scientific literature; interpret and critique statistical methods, inference, graphs, and experimental design; offer alternative explanations for observed ecological patterns; suggest new/novel experiments/pseudo-experiments to test fundamental ecological hypotheses.
- **Student learning objectives, professional development:** identify granting agencies/organizations that fund basic and applied ecological research; learn to conduct a peer-reviews for manuscripts submitted for publication; contribute to the development and completion of a class concepts/review paper for submission to a peer-reviewed journal; practice public speaking; demonstrate thorough peer-evaluation and self-evaluation regarding of professional effort and final work products produced in this course.

COURSE ASSESSMENT METHODS

- Observation of in-class student discussions and in-class exercises; written and quantitative evaluation of the student's ability to lead a paper discussion; written and quantitative evaluation of weekly journal article annotations (annotated bibliography) and assignments; written and quantitative evaluation of the student's contribution to the class concepts paper including peer-evaluation; written and quantitative evaluation of a final written essay exam; peer and self-assessments, attendance.

LIST OF ASSIGNMENTS

	DUE DATE	POINTS AVAILABLE
1. Lead 2 peer-reviewed paper discussions (5 pts. each)	Not specified	10
2. Participate in peer-reviewed paper discussions (1 pt. each)	Every Monday	20
3. Annotated bibliography of peer-reviewed papers used for discussions	Every Monday	5
4. Writing a peer-review for a manuscript submitted to a scientific journal	Sept. 11	5
5. Identifying funding opportunities	Oct. 14	5
6. Comprehensive written take home exam	Nov. 18	25
7. Class concepts paper (group assignment)	Dec. 02	25
8. Peer-assessment & self-assessment	Dec. 10	5

A full description of all assignments and associated evaluation metrics are provided below.

ATTENDANCE: you are permitted 1-unexcused absence; each additional un-excused absence results in 1-point deduction from your course total.

1. Lead 2 peer-reviewed paper discussion (5 points each, 10 points total) – No specified due date

Leading a class through the discussion of a scientific paper, which is a form of public speaking, can be an intimidating task. However, we are in this learning journey together. Please take a deep breath and relax. I will teach you (1) how to read and digest a scientific paper as well as (2) methods for effectively leading a diverse class through a conceptually rich and constructive peer-reviewed paper discussion. Further, I will lead the first couple of discussions to model how to lead a paper discussion – pairing a classic paper with a contemporary paper to help us learn how the focal area represented in the classic paper was first defined, what was initially known and then examine how far the theories, principles, hypotheses and methods presented in the classic paper have progress over time.

Here are some helpful resources to learn more about reading scientific papers and leading paper discussions.

<https://arthropodecology.com/2015/01/21/leading-a-discussion-of-a-scientific-paper/>

https://uvic470ecology.weebly.com/uploads/1/2/4/4/12445281/470_howtoleaddiscussion.pdf

<https://www2.tulane.edu/sse/eebio/academics/graduate/scientific-journal.cfm>

<https://www.sciencemag.org/careers/2016/03/how-seriously-read-scientific-paper>

Evaluation: leading a peer-reviewed paper discussion rubric:

	5 Excellent	4 Competent	3 Needs Improvement	2 Poor	1 Unacceptable
Content <ul style="list-style-type: none"> • Presents a quick summary of the paper (5 minutes max) • Clearly states hypotheses, predictions and/or objectives • Clearly states the general findings/results • Discusses the relevance to ecology in general and to other fields, if applicable 					
Discussion <ul style="list-style-type: none"> • Solicits classmates to share their opinion on the strengths of the paper with specific examples • Helps students interpret graphs, tables, figures • Asks thoughtful questions to promote the discussion about the science presented in the paper • Listens carefully to questions posed by classmates • Solicits classmates to share their opinion of the weaknesses of the paper with specific examples • Gets the class discussing why the classical paper is considered fundamental to ecology • Gets the class to discuss whether they think the contemporary paper we discuss will someday be consider fundamental 					

2. Participate in peer-reviewed paper discussion (1 point each, 20 points total) – No specified due date

Again, speaking up in class, which is a form of public speaking, can be intimidating and often pushes students outside their comfort zone. However, being able to articulate clearly your understanding of fundamental ecological concepts as well as your perspectives on the strengths, weakness and contributions of published scientific studies to the field of ecology is essential for your development as a scientist. As such, my classroom is an intellectually safe space for all students to share their thoughts, ask questions, be creative in their learning process and engage in respectful discourse about the conceptually rich and challenging ideas inherent in the diverse field of ecology. We will all learn and grow together as we read classic and contemporary ecological literature, reflect on our biases and assumptions and consider the ideas and perspectives of other class participants.

Evaluation: To earn a point for participating in peer-reviewed paper discussions, you must contribute to the discussion in a meaningful way such as (1) posing an insightful question that spurs the discussion, (2) respond in a thorough and thought manner if/when the discussion leader solicits your opinion, (3) provide an example of from beyond the paper to convey a

concept/idea, (4) pose an alternative explanation for the findings, (5) suggest a follow-up experiment or study to test the stated hypothesis, etc....

3. Annotated bibliography (5 points) – Annotations are due every Monday, complete annotated bibliography due 12/2

Creating an annotated bibliography is an excellent way to help you not only keep track of the conceptually rich literature we will examine throughout the semester but also help you prepare for leading and participating in class discussions. In fact, creating an annotated bibliography will help you summarize the most important facts from each paper, highlight the ecological theories, principles and hypotheses discussed, report the most important findings, identify the important ecologists/authors that completed this work and help you understand the chronology of the development of this exciting field of research.

Here are some helpful resources to learn more about creating an annotated bibliography:

<https://guides.library.cornell.edu/annotatedbibliography>

http://writingcenter.kennesaw.edu/resources/handouts_print/ANNOTATED_BIBLIOGRAPHY.pdf

https://sites.umuc.edu/library/libhow/bibliography_tutorial.cfm

The annotated bibliography you create must have the following components:

(a) Citations for each article must be in bold following the style of the journal *Ecology*.

(b) A concise annotation that summarizes the central theme and scope of the article that includes the following:

- one or more sentences that evaluate the authority or background of the author,
- a comment on the intended audience,
- a comparison or contrast of this article with the corresponding contemporary article you review or an alternative article you find compelling on this topic,
- explain how this work contributes to the advancement of ecology.

(c) The completed annotated bibliography must be presented in a consistent, professional manner.

Evaluation: To receive credit for this assignment, you will create a continuous annotated bibliography throughout the duration of this course, which will be updated weekly. Specifically, you must submit an updated annotated bibliography that includes the annotation for the articles we review each week prior to discussion (due each Monday before class). Throughout the semester, I will provide feedback and suggestions to improve the content, clarity and presentation of your annotated bibliography. In total, we will read and discuss between 20-24 papers this semester and thus you will have 20-24 corresponding annotations. For this assignment, you will receive either 5 points or 0 points based on (a) having turned in every annotation on time, (b) having completed all annotations based on the specification above, and (c) the professional quality of your work.

4. Writing a peer-review for a scientific journal (5 points) – Due 09/30

Contributing to the peer-review process is an important aspect of professional scientific service. Prior to publication, journal articles are peer-reviewed by one or more members of the journal's editorial staff as well as 2-3 experts from the specific field of study (e.g., population ecology, behavioral ecology). As a rule of thumb, if you submit one paper for peer-review each year, you should plan to review three papers that same year. During this class, you will learn the basic requirements for a reviewer to complete the peer-review process and you will have the opportunity to write a peer-review for a manuscript submitted to an ecological journal for publication consideration.

Here are some helpful resources to learn more providing a constructive peer-review for a scientific journal:

<https://www.sciencemag.org/careers/2016/09/how-review-paper>

<https://twp.duke.edu/sites/twp.duke.edu/files/file-attachments/scientific-article-review.original.pdf>

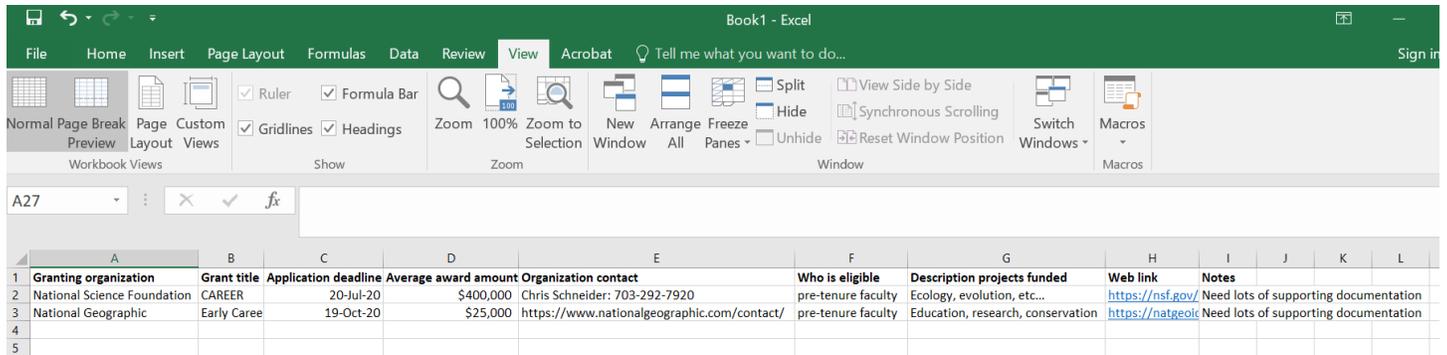
<https://www.journals.elsevier.com/applied-soft-computing/news/tips-and-advice-when-you-review-a-scientific-paper>

Evaluation: To receive credit for this assignment (5 points or 0 points), you must provide a thorough and constructive review of the article you are given by providing insightful conceptual suggestions/feedback as well as in-line edits associated with the clarity of the writing. The peer-review process includes every component of the manuscript – from title to bibliography. As such, adhering to professional scientific writing standards you must provide (a) a brief annotation or summary of the article in 4-7 sentences, (b) a brief paragraph describing the specific strengths of the article and what this body of work will do to advance the field (if any), (c) a brief paragraph describing the general weaknesses of the article, (d) explicit descriptions of conceptual problems with the article and how you suggest the authors' address these issues, (e) line-by-line edits to identify typographical errors, poor sentence structure, etc.... and (f) finally you must state whether or not you would:

- accept for publication as currently written
- accept for publication with minor edits
- accept for publication once major edits are complete
- reject but encourage resubmission if weaknesses can be addressed
- reject this manuscript due to fatal flaws in the study design that cannot be overcome

5. Identify funding opportunities (5 points) – Due 10/14

Creative ideas fuel scientific endeavors, yet without capable people and financial support creative ideas rarely are realized. As future leaders in the field of ecology, you must develop your knowledge of the many different funding organizations and mechanism available to help support ecological research locally, nationally and internationally. As such, you will create a “database” of funding opportunities relevant for your specific ecological interests. Following the example provided below, create an Excel file with a minimum of 30 funding opportunities with the following information:



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L
	Granting organization	Grant title	Application deadline	Average award amount	Organization contact	Who is eligible	Description projects funded	Web link	Notes			
2	National Science Foundation	CAREER	20-Jul-20	\$400,000	Chris Schneider: 703-292-7920	pre-tenure faculty	Ecology, evolution, etc...	https://nsf.gov	Need lots of supporting documentation			
3	National Geographic	Early Career	19-Oct-20	\$25,000	https://www.nationalgeographic.com/contact/	pre-tenure faculty	Education, research, conservation	https://natgeol	Need lots of supporting documentation			
4												
5												

Evaluation: To receive credit for this assignment (5 points or 0 points), you must complete this assignment as describe above.

6. Comprehensive exam (25 points) – Due 11/18

Demonstrating proficiency in student learning objectives for **knowledge, critical thinking** and **professional development** is essential for your advancement as future ecologists. While discussions, assignments, and activities throughout this course will undoubtedly contribute to your personal and professional growth, as each of you strive for advanced degrees (MS, PhD), preparing for and successfully passing your comprehensive exam, also known as candidacy exam, is an import step not only in demonstrating to your advisors, committee members, professors, and colleagues your ability to think like a scientist but to demonstrate to yourself that you deserve to be here! As such, I will also evaluate the depth and breadth of your ecological knowledge, critical thinking skills and ability to think like a professional scientist by administering a PhD candidacy-style comprehensive exam that will cover topics related to classic and contemporary ecological theories, principles and hypotheses as well as professional development. This exam will push you to the boundaries of your knowledge.

Evaluation: I will grade this exam in a traditional manner. As such, your responses must be scientifically accurate, synthesize your understanding of important concepts, eloquent, and professional. This is your opportunity to show me that you’ve got what it takes to tackle the intellectual challenges essential for advancing the field of ecology!

7. Class concepts paper (25 points) – Due 12/2

This is a big, cumbersome assignment that is time-sensitive/intensive and will push you conceptually and emotionally throughout the duration of the semester. However, this is a TEAM effort. As such, you will succeed or fail at producing a publishable manuscript as a team. Regardless of the outcome, striving to create a compelling concepts paper for publication in a peer-reviewed journal as a class will undoubtedly be a learning adventure for all of us!

Here are some helpful resources for moving this project forward in a timely manner:

<https://guides.lib.umich.edu/c.php?g=283300&p=2915110>

<https://www.editage.com/insights/a-young-researchers-guide-to-perspective-commentary-and-opinion-articles>

[https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1890/1540-9295\(2007\)5%5B145:FKGIPA%5D2.0.CO%3B2](https://esajournals.onlinelibrary.wiley.com/doi/abs/10.1890/1540-9295(2007)5%5B145:FKGIPA%5D2.0.CO%3B2)

As a class, you will:

- brainstorm ideas about potential topics for your class paper and identify one topic that is achievable during the semester
- determine an appropriate journal for article submission
- create a class “Google Drive” or folder accessible to all members for organizing materials
- create an outline for major sections of the paper
- identify collaborator strengths (e.g., GIS, writing, quantitative) and assign tasks to each collaborator
- establish a reasonable time line to ensure tasks are completed on time
- assign order of authorship (I’ll be the last author)
- format your manuscript based on journal specifications
- submit your manuscript for publication

Evaluation: I will grade your paper in a traditional manner. As such, your writing must be scientifically accurate and adhere to professional scientific writing standards, per the journal's specifications.

Tentative Course Schedule

	Discussion schedule	Class concepts paper development schedule	Assignments and due dates
Week 1 8/26-8/30	Welcome to Foundations of Ecology		
	How to read/review a scientific paper	What is a concepts/review paper?	
Week 2 9/2-9/6	Labor Day – no class		
		Brainstorming topics	
Week 3 9/9-9/13	Discussion (Lafferty)		
		Brainstorming topics	
Week 4 9/16-9/20	Discussion (Lafferty)		Peer-review assigned
		Identify topic, target journal, outline....	
Week 5 9/23-9/27	Discussion		
		In-class working session	
Week 6 9/30-10/4	Guest instructor	In-class working session	Peer-review (09/30)
		In-class working session	
Week 7 10/7-10/11	Discussion		
		1 st working draft	
Week 8 10/14-10/18	Discussion		Identifying funding opportunities (10/14)
		Evaluate progress, re-organize	
Week 9 10/21-10/25	Discussion		
		In-class working session	
Week 10 10/28-11/1	Discussion		
		In-class working session	
Week 11 11/4-11/8	Discussion		
		2 nd working draft	
Week 12 11/11-11/15	Discussion		
		In-class working session	
Week 13 11/18-11/22	Discussion		Comprehensive exam (11/18)
		In-class working session	
Week 14 11/25-11/29	<i>Thanksgiving Break</i>		
Week 15 12/2-12/6	Discussion		Class concepts paper (12/2)
			Annotated bibliography (complete 12/4)
Week 16 12/9-12/13	Peer-evaluation & Self-evaluation 12:00 am Tuesday, December 10, 2019		

CLASS EXPECTATIONS

Please arrive on time, bring your discussion papers (printed or on your computer), and be prepared to engage in conceptually rich class discussions, debates, and activities. Attendance is critical because this is an engaged learning class and there will be activities and discussion during every session.

Lateness and absences will adversely affect your grade. You will be considered late to class if you arrive later than 12:01 pm. You are permitted to be late once without penalty; however, for each additional time you are late to class you will lose 0.5 points from your classroom participation grade. In addition, you will be considered absent from class if you arrive later than 12:30 pm or do not attend class. You are permitted to miss one class period during the semester without penalty (no questions asked); however, for each additional absence I will deduct 1 point from your course total at the end of the semester. Late assignments will not be accepted. If you are late or absent for an exceptional reason, you must provide formal documentation stating which classes/deadlines were affected and explain the reason behind the absence; all documentation will be subject to strict verification.

FOOD & DRINKS

Please, eat, drink and be merry! You can bring food and drinks to class, so long as it is quiet (e.g., no crackling chip bags) and does not give off a strong odor that will make everyone hungry (unless you bring enough to share with everyone) or nauseated. I recommend drinks with lids to minimize the risk of spilling on people, computers, and desks (yes, it has happened).

COURSE EDUCAT PAGE

If you're reading this syllabus online you've already found the official EduCat page for this course. The EduCat page will provide all the readings you will need throughout the semester. You are responsible for checking EduCat to ensure you are prepared for each class period and for all assignments.

ASSIGNMENT SUBMISSION

All assignments will be handled through EduCat. This will be a paperless course. For each assignment, I will create a folder or Google Doc with the assignment title and due date. The location of the folder in EduCat will correspond with the due date of the assignment.

FEEDBACK & GRADING

To the extent possible, focus on learning in this course rather than grades. Foundations of Ecology is a subject that requires substantial reading, cognitive flexibility, reflection, constructive and often times critical evaluation of the literature, topics/ideas covered as well as creativity and enthusiasm. This class should be a place where eco-evolutionary theories get you excited and motivate you to think deeply about how to test fundamental and contemporary hypotheses to move the field of Ecology forward. I will do my best to facilitate respectful discussions and I will provide guidance and feedback on your oral and written contributions to this class. I expect you to make appropriate changes to your study habits, verbal and written contributions, and to improve your work products throughout the semester.

GRADUATE STUDENT GRADING SCALE:

A	> 94%
A-	90%
B+	87%
B	84%
B-	80%
F	< 79.4

UNDERGRADUATE STUDENT GRADING SCALE:

A	> 94%
A-	90%
B+	87%
B	84%
B-	80%
C+	77%
C	74%
C-	70%
F	< 69.4%

ACADEMIC INTEGRITY: Do not cheat! Although you may be encouraged to work together in-class or out-of-class occasionally, and you may give or receive consulting help to/from each other at specified times, you must complete your own work or not tell others your answers to questions on exams, which you are to complete independently. All the work you submit must be your own. The minimum penalty for cheating or plagiarizing on any assignment or exam will be a zero grade for that assignment/exam (no exceptions) and you will be reported to the Dean of Student (no exceptions). If you are caught cheating on a second assignment you will be given a grade of “F” for this course. Do not cheat!

INDIVIDUAL CONSULTATION: Please come see me if you have difficulty understanding the material or have questions or concerns about any portion of this course. If my office hours do not work for your schedule, we can arrangements to meet at another time.

NMU’S NON-DISCRIMINATION STATEMENT: Northern Michigan University does not unlawfully discriminate on the basis of race, color, religion, sex, national origin, age, height, weight, marital status, familial status, handicap/disability, sexual orientation, or veteran status in employment or the provision of services, and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities an equal opportunity to participate in all programs and activities. Anyone having civil rights inquiries may contact the Equal Opportunity Office, 158 Services Building 502, telephone number 906-227-2420.

DISABILITY SERVICES: If you have a need for disability-related accommodations or services, please inform the Coordinator of Disability Services in the Dean of Students Office at 2001 C. B. Hedgcock Building (227-1700). Reasonable and effective accommodations and services will be provided to students if requests are made in a timely manner, with appropriate documentation, in accordance with federal, state, and University guidelines.