



Entomology/Botany/Forest & Wildlife Ecology/Zoology 821 Foundations of Ecology

General Course Information

Credits: 2

Course Webpage: <https://canvas.wisc.edu/courses/448507>

Course Attributes: Graduate

Meeting Time: Tuesday 1:00PM-3:15PM

Location: 147 Russell Labs

Instructional Mode: in-person

Credit hours follow the traditional Carnegie definition: The credit standard for this course is met by an expectation of a total of 90 hours of student engagement with the course learning activities (at least 45 hours per credit), which includes regularly scheduled instructor:student meeting times for 2 hours per week, reading, writing, and student-led presentations as described in the syllabus.

Regular and Substantive Student-Instructor Interaction: Regular and substantive student-instructor interaction, as defined by the US Department of Education (Within [34 C.F.R. §600.2](#)), includes direct instruction, providing feedback on student work, providing information about course content, facilitating discussion of course content, and regular interaction in a lab setting.

Other Course Information

Instructor: Sean Schoville

Contact: E-mail: schoville2@wisc.edu; Phone: 608-262-2956

Office: 637 Russell Labs

Office Hours: The instructor is available to meet with students remotely or in person. Please email to arrange an appointment.

Course Description: Foundational ideas in the field of ecology. Discussion topics trace the development of ecology as a discipline, and the roots of modern ecological thought, as well as the research approaches in ecology.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Course Learning Outcomes

Upon completion of this course, graduate students will:

- 1) identify and describe key debates in the history of ecology and ongoing controversies in the field.
- 2) differentiate ecological processes and how they sustain ecological systems
- 3) moderate and participate in discussions about the significance of important ecological concepts
- 4) summarize, interpret, and synthesize conceptual theories of ecology orally and in writing
- 5) evaluate peer work and provide constructive, professional feedback.

Course Grading



Grade Scale: A 92.5-100%, AB 87.5-92.4%, B 82.5-87.4%, BC 77.5-82.4%, C 69.5-77.4%, D 59.5-69.4%, F <59.4%. All assignments and exams will be graded on a scale from 1 to 100. This class does not use a grading curve.

Assignment	Learning Outcomes	Points	Grade Percentage	Due Date
Weekly questions and participation	1, 2, 3	150	30%	Weekly
Moderation of one topic	1, 2, 3, 4	100	20%	TBD
Draft Synthetic Review	1, 2, 4	125	25%	Week 12
Peer Review	1, 2, 4, 5	100	20%	Week 13
Final Synthetic Review	1, 2, 4	25	5%	Week 15

Incompletes: To qualify for an incomplete, you must have 1) completed all course work except the Review, 2) have a C average or above, and 3) provide documentation for an unforeseen circumstance (illness, accident, sudden death in family) before the last day of classes.

Absences: Attendance at every meeting is expected and constitutes the basis for your grade. Please approach me in advance if you have a conflict between a religious observance and scheduled meeting date. You must discuss planned absences at least a week in advance of the meeting date. If an unforeseen circumstance occurs (illness, accident, sudden death in family), you need to contact me with a well-justified explanation. Only one missed attendance will be dropped from your overall grade.

Course Reading Material

You will read 13 scientific articles over the course of the semester, which are available as pdf files on Canvas and listed below on the calendar. You should read each paper, develop questions, and share those questions on canvas prior to our Tuesday discussion of these papers.

Description of Assignments

Weekly questions and participation: You are expected to post 2-3 discussion questions or comments to Canvas in advance of each meeting, attend meetings, and actively engage in the discussion (30%). Please see attached rubric for grading criteria.

Journal Article Moderation: With a partner or small group, you will read, summarize, and critique a topic using the assigned papers (20%). Prepare a power point presentation that integrates: A) Background on the paper, B) an outline of the major arguments and data presented in the paper, C) key topical questions (including those provided on canvas by other students in the course), and D) future directions to improve research findings in this field.

Draft and Final Synthetic Review Paper: You will review recent scientific literature assessing methodological developments on a topic in Ecology (combined 30%). Expect to write 8-10 pages single-spaced, but including tables, figures, and references (minimum 10 references). The first draft will represent your original work (25%), and a final draft will integrate comments from one peer reviewer (5%). Please set up a meeting to discuss your proposed review. Further guidelines are provided in the rubric.

Peer Review: You will develop a formal peer review of another students' paper (20%). The peer review should be anonymous, addressed to a journal editor, and encompass a summary, constructive comments, questions, and criticisms. Reviews should contain: A) 1-2 paragraphs summarizing the paper, with positive feedback. B) Major criticisms relating to conceptual issues, alternative interpretations, or gaps in knowledge. C) Minor criticisms relating to writing composition, length, and clarity.

Course Schedule		
Meeting Date	Topic	References
January 21, 2025	1. Why study ecology?	Belovsky, G.E., Botkin, D.B., Cowl, T.A., Cummins, K.W., Franklin, J.F., Hunter, M.L., Joern, A., Lindenmayer, D.B., MacMAHON, J.A., Margules, C.R. and Scott, J.M., 2004. Ten suggestions to strengthen the science of ecology. <i>BioScience</i> , 54(4): 345-351. Grainger, T.N., Senthilnathan, A., Ke, P.J., Barbour, M.A., Jones, N.T., DeLong, J.P., Otto, S.P., O'connor, M.I., Coblentz, K.E., Goel, N. and Sakarchi, J., 2022. An empiricist's guide to using ecological theory. <i>The American Naturalist</i> , 199: 1-20.
January 28, 2025	2. Population ecology: theory and experiments	Birch, L.C. 1948. The intrinsic rate of natural increase of an insect population. <i>The Journal of Animal Ecology</i> 17: 15-26 Hanski, I., 1998. Metapopulation dynamics. <i>Nature</i> 396(6706): 41-49.
February 04, 2025	3. Species interactions: predation and competition	Wilbur, H. M. 1972. Competition, predation, and the structure of the <i>Ambystoma-Rana sylvatica</i> community. <i>Ecology</i> 53: 3-21.
February 11, 2025	4. Species interactions: coevolution	Ehrlich, P.R., and P. H. Raven. 1964. Butterflies and plants: a study in coevolution. <i>Evolution</i> 18: 586-608
February 18, 2025	5. Ecological Niche	Grinnell, J. 1917. The niche-relationships of the California Thrasher. <i>The Auk</i> 34: 427-33. Brown, J.H., Gillooly, J.F., Allen, A.P., Savage, V.M. and West, G.B., 2004. Toward a metabolic theory of ecology. <i>Ecology</i> 85(7): 1771-1789.

February 25, 2025	6. Niche Prediction and Climate Change	Pearson, RG, Dawson, TP. 2003. Predicting the impacts of climate change on the distribution of species: are bioclimate envelope models useful? <i>Global Ecology and Biogeography</i> 12: 361-371
March 04, 2025	7. Spatial Biodiversity: species richness	Hutchinson, G.E. 1959. Homage to Santa Rosalia; or, why are there so many kinds of animals? <i>The American Naturalist</i> 93: 145-59. Janzen, D.H., 1967. Why mountain passes are higher in the tropics. <i>The American Naturalist</i> 101(919): 233-249.
March 11, 2025	8. Spatial Biodiversity: abundance and dispersal	Simberloff, D.S., and E.O. Wilson. 1969. Experimental zoogeography of islands: the colonization of empty islands. <i>Ecology</i> 50: 278-96. Hubbell, S. 1979. Tree dispersion, abundance, and diversity in a tropical dry forest. <i>Science</i> 203: 1299–1309.
March 18, 2025	9. Behavioral Ecology	Charnov, E. L. 1976. Optimal foraging: the marginal value theorem. <i>Theoretical Population Biology</i> 9: 129–136. Holt RD. Predation, apparent competition, and the structure of prey communities. <i>Theoretical population biology</i> . 1977 Oct 1;12(2):197-229.
March 22-30, 2025	Spring Break	
April 01, 2025	10. Trophic and Resource Ecology	Schindler, D. W. 1977. Evolution of phosphorus limitation in lakes. <i>Science</i> 195: 260–262. Carpenter, S. R., J. F. Kitchell, J. R. Hodgson, P. A. Cochran, J. J. Elser, M. M. Elser, D. M. Lodge, D. Kretchmer, X. He, and C. N. von Ende. 1987. Regulation of lake primary productivity by food web structure. <i>Ecology</i> 68: 1863–1876.
April 08, 2025	11. Spatial Pattern and Inference I	Bray, J.R. and J. T. Curtis. 1957 An ordination of the upland forest

		communities of southern Wisconsin. <i>Ecological Monographs</i> 27: 325-49
April 15, 2025	12. Spatial Pattern and Inference II	Turner, MG. 1989. Landscape ecology - the effect of pattern on process. <i>Annual Review of Ecology and Systematics</i> 20: 171-197
April 22, 2025	13. Community Ecology I	McGill, BJ, Enquist, BJ, Weiher, E, Westoby, M. 2006. Rebuilding community ecology from functional traits. <i>Trends in Ecology and Evolution</i> 21: 178-185 Leibold, MA, Holyoak, M, Mouquet, N, Amarasekare, P, Chase, JM, Hoopes, MF, Holt, RD, Shurin, JB, Law, R, Tilman, D, Loreau, M, Gonzalez, A. 2004. The metacommunity concept: a framework for multi-scale community ecology. <i>Ecology Letters</i> 7: 610-613
April 29, 2025	14. Community Ecology II	Vellend, Mark. 2010. Conceptual synthesis in community ecology. <i>The Quarterly review of biology</i> 85(2): 183-206.
There is no final for this class.		

How to Succeed in this Course

Engagement, discussion, and a positive learning environment are essential to learning in this course. You'll be working in groups to lead a discussion, but you also need to come prepared to discussions by reading and generating questions about the assigned papers.

Grievance issues: If you have concerns about the course or are experiencing negative interpersonal issues in class, please see me to work out a solution. If you require confidentiality, please contact Emily Laabs (emily.laabs@wisc.edu) and make an appointment to speak with her about your situation.

Course evaluation: Students will be provided with an opportunity to evaluate this course and your learning experience. Student participation is an integral component of this course, and your confidential feedback is important to me. I strongly encourage you to participate in the course evaluation. UW-Madison uses a digital course evaluation survey tool called [AEFIS](#). For this course, you will receive an official email two weeks prior to the end of the semester, notifying you that your course evaluation is available. In the email you will receive a link to log into the course evaluation with your NetID. Evaluations are anonymous. Your participation is an integral component of this course, and your feedback is important to me. I strongly encourage you to participate in the course evaluation.

University Policies That Apply to This Course



The University of Wisconsin - Madison is dedicated to a safe, supportive, and non-discriminatory learning environment. It is the responsibility of all undergraduate and graduate students to familiarize themselves with university policies regarding coursework.

ACADEMIC POLICIES AND STATEMENTS

- [Academic Calendar & Religious Observances](#)
- [Academic Integrity Statement](#)
- [Accommodations for Students with Disabilities](#)
- [Course Evaluations](#)
- [Diversity & Inclusion Statement](#)
- [Mental Health and Well-Being Statement](#)
- [Privacy of Student Records & the Use of Audio Recorded Lectures Statement](#)
- [Students' Rules, Rights & Responsibilities](#)
- [Teaching & Learning Data Transparency Statement](#)



Participation Rubric

Participation is assessed each class (10 points each), for a total of 150 possible points:

Outstanding Contributor: Student comes to class prepared; contributes readily to the conversation but doesn't dominate it; provides excellent discussion questions in advance; makes thoughtful contributions based on the literature that advance the conversation; shows an interest in and respect for others' contributions; participates actively in all discussions. (Outstanding contributors will receive full credit = 10 points.)

Good Contributor: Comes to class prepared and makes thoughtful comments when called upon; provides discussion questions in advance; contributes occasionally without prompting; shows interest in and respect for other's views; participates actively in all discussions. (Good contributors will receive 8 out of 10 points.)

Adequate Contributor: Comes to class prepared, provides questions, but only minimally contributes. (Adequate contributors will receive 6 out of 10 points.)

Unsatisfactory Contributor: Contributions in class reflect some but inadequate preparation. Either discussion questions were not provided, or the student does not attend the discussion (Unsatisfactory contributors will receive 4 out of 10 points.)

Non-contributor: This person does not attend class and does not provide questions for discussion. (Non-contributors will receive 0 out of 10 points.)



Graduate Student Synthetic Review Paper: Instructions & Rubric

Your synthetic review for the Foundations of Ecology will consist of an in-depth literature review, wherein you will demonstrate expertise synthesizing knowledge about your ecological topic of choice. You can choose to focus on a topic relevant to your own thesis or dissertation, though you may need to broaden/narrow the question addressed in the review to make it reasonable for a thorough 8–10-page paper. Remember that part of your task is to appropriately choose a narrow topic, but one with sufficient literature to review. Your task will be to critically evaluate the topic developed in peer-reviewed journal articles, to summarize the different studies, evaluate the assumptions and interpretations they make, and to critique the choice of experimental methods/design that was employed. You will assess the assumptions and abilities of these studies to answer your research question and make recommendations on improving the methods (e.g. by improving experimental design) or illustrate the work needed to discern their advantages/disadvantages (testing with simulations, meta-analyses of empirical datasets, etc.). This is your chance to build expertise on a topic that is important in ecology, and to develop a written summary that could become a part of your thesis or even a separate review article.

Expect to write 8-10 pages, single-spaced. Provide page numbers and line numbers (continuous is preferred). You should include visual aids to help your audience understand the methodologies (tables/figures should not take up more than 4 pages of the 8-10 total). Please review at least 10 papers and cite them appropriately (use the formatting style found in the journal Ecology).

During week 5, I will briefly check in with each person to see whether you've chosen a topic. Follow this up with an in-person meeting if we have not discussed your final topic. Please feel free to ask me for feedback during the semester about this assignment. I also suggest showing an outline of your paper to another person in class, so that they may give you feedback.

Draft review papers are due at the end of week 12, and the final version (incorporating a Response to Review letter as an additional attachment) at the end of week 15.

Learning Objectives for synthetic review paper:

1. Students will demonstrate critical thinking skills in evaluating the focal topic, synthesize concepts from the course in discussing these methods and how they have been applied, and propose approaches to extend scientific insights on the topic [40%].
2. Students will demonstrate knowledge in describing how ecological data and methodological assumptions should be evaluated to ensure rigorous experimental design [35%].
3. Students will demonstrate excellent writing style and presentation, to convey clearly and concisely their review of these methods [25%].

Rubric: Synthetic Review Project: (120 points)

Expectations	Not Acceptable	Below Standard	At Standard	Above Standard	Excellent	Points Awarded
Quality of Writing and Presentation						
Written aspects of project demonstrate significant effort, are engaging, <i>easy to understand</i> , and edited.						/15
Graphical aspects are visually attractive, <i>easy to understand</i> , and edited						/15
Factual aspects						
Introduction/background on your topic is thoroughly explained with attention to important details. If this is about your study system (MS or PhD project), describe the problem/questions you are seeking to answer, the constraints of your study system, and justify the set of studies you are investigating.						/15
Clearly explain the reviewed papers with an attention to important details, especially regarding assumptions, experimental design, and statistical methods.						/20
Differentiate the studies based on their system and experimental approaches, or other criteria. Use of tables/graphics is helpful here.						/10
Discussion should provide a clear summary of the results from your review. Clearly address the ability of the studies to answer your main research question.						/15

Future directions to improve upon these studies should be discussed. These suggestions should be logical, clearly articulated, and described with reference to the data or experimental approach required.						/10
At least 10 references are cited; paper meets page limits.						/5
Overall						
Communication of overall understanding (big picture).						/20
Response to Review						
Response to reviewer letter is included with a point-by-point response.						/25

Comments:



Peer Review Rubric

Peer review of one of your colleague's research papers will be an opportunity to practice the peer review process, as well as help them improve the impact of their review paper. This exercise will be worth a total of 100 possible points:

Summary statement: Prepare a brief summary of the paper (one long paragraph), with careful attention to pointing out the strengths of the paper along with its major contributions to the literature. (25 points.)

Major revisions: List any major changes that the author needs to make to strengthen their paper prior to publication. Criticism should be accompanied with suggestions on how to address the criticism and should be realistic. Major revisions include critical misunderstanding or other conceptual points that need to be addressed, analyses that need to be undertaken, data collection gaps, or major compositional changes to the text (40 points.)

Minor Revisions: Provide minor typographical or aesthetic edits of the text, tables or figures in a section identified as minor revisions. List them relative to page and/or line number. (25 points.)

Above and Beyond: These days, papers are sometimes transferred to a different journal. Considering the topic of study, make a suggestion on where similar papers should be submitted to reach the most appropriate audience. (10 points.)