

SYLLABUS: RESTORATION ECOLOGY (NRSM465)

Tuesdays & Thursdays, 2:00PM-3:20PM, Eck 204
SPRING 2024

Introduction

This course covers the primary ecological theories that inform the practice of ecological restoration, appropriate experimental design for making inference about restoration success and effects of restoration treatments, and the nuts and bolts of writing a scientific research paper. Scientific concepts covered include community assembly, the dynamic nature of ecological systems, biodiversity and ecosystem functioning, ecological resilience, genetic considerations for restoration, food web dynamics, and statistical issues and study design. In addition to lectures on scientific theory and application to restoration practice, the course includes peer-learning activities that allow students to develop skill in critiquing, synthesizing, and writing scientific information. The semester will end with student-led debates on controversial topics within restoration ecology.

The course has a substantial focus on scientific writing and fulfills the General Education “Advanced Writing” requirement. Intensive writing assignments include: two critical analyses of scientific articles, an essay-style mid-term exam, pro and con debate statements, and a research paper that requires submission of a draft and revised version. Roughly 20% of class lectures are devoted to exploring the structure of research articles and best practices for technical writing.

This course is appropriate for advanced undergraduate and graduate students interested in improving their understanding of the science and practice of ecological restoration. Prerequisites include at least one advanced undergraduate course in ecology and one course in ecological restoration. All pre-requisites must be met prior to enrollment. Graduate students are encouraged to integrate class assignments into their thesis or dissertation research.

Instructor

Dr. Cara R Nelson, Department of Ecosystem and Conservation Sciences, Franke College of Forestry and Conservation.

- Email: cara.nelson@umontana.edu
- Mobile phone: 406-241-2478
- Campus Mailbox: 413-A Clapp (room with the photocopier)
- Office and Office Hours: Please come visit to discuss course assignment and content, or restoration in general.
 - Mondays 1:00-3:00PM by appointment in Cara’s Office (460-C Clapp). Schedule meetings [here](#) (appointments must be scheduled by the previous Friday). Once all meeting times for a given Monday have been scheduled, the calendar will no longer show that Monday as available.
 - Thursdays after class (3:30-4:30PM) in the Eck Building. No appointment needed.
 - If you are unavailable during office hours, other times can be arranged.

Expectations and Time Commitment

Restoration Ecology is an advanced course that requires that students integrate knowledge rather than just memorizing and repeating ideas presented in lecture. As such, course assignments and exams are deliberately challenging and are designed to facilitate integration of material covered in class, knowledge gained from other coursework, and relevant work experiences, if applicable.

Consistent with three credits, the course requires an average of six hours of homework per week outside of

class time. A commitment to coming to class prepared to discuss ideas, dilemmas and solutions is necessary for success. Homework includes articles from the primary scientific literature, which generally require reading multiple times to understand content. To successfully complete the course writing assignments, students will need to allow time for writing, re-writing, and copy editing prior to submitting assignments. Please consider this time commitment in planning your schedule.

Course Objectives and Learning Outcomes

The objectives of this course are to provide students with foundational knowledge in restoration ecology and to improve their skill in critical thinking and scientific writing.

Specific Ecological Objectives

- To explore fundamental ecological theories and their relevance to the practice of ecological restoration;
- To explore best practices for designing experiments in restoration ecology; and
- To examine the principles of scientific inference and to critically apply these principles to both ecological theory and restoration practice.

Specific Objectives Related to Writing

- To identify and pursue sophisticated questions for inquiry;
- To find, evaluate, analyze, and synthesize information from the scientific literature;
- To explore the structure of scientific research articles and practice scientific writing;
- To recognize the purposes and needs of discipline-specific audiences and adopt the appropriate voice for different kinds of science writing;
- To use multiple drafts, revision, and editing in conducting inquiry and preparing written work;
- To follow the conventions of citation, documentation, and formal presentation appropriate to the discipline of ecology;
- To develop competence in information technology and digital literacy, including using cite-while-you-write software; and
- To manage information from diverse perspectives.

Learning Outcomes

By completing this course students will be able to:

- Integrate key ecological theories into restoration practice;
- Identify and discuss the relevance of scientific ideas for use in a practical framework;
- Analyze and succinctly summarize articles from the peer-reviewed literature;
- Use library resources and electronic databases to find scientific information;
- Use published literature to develop research ideas and answer research questions;
- Express complex scientific ideas in concise and clear writing;
- Write a research paper in a standard scientific format;
- Use electronic reference software for managing citations and preparing bibliographies; and
- Develop logical and persuasive arguments about concepts in restoration ecology and communicate ideas orally.

Course Reading

Reading Materials

- *Foundations of Restoration Ecology*. **FIRST EDITION**. D.A. Falk, M.A. Palmer and J.B. Zedler eds., Island

Press. 2006. Note that we will be using the FIRST edition of this textbook, rather than the more recently published second edition, because the chapters in the first edition provide clearer explanations of course content. The complete book can be accessed at for free at:

[https://www.researchgate.net/publication/40777417 Foundations of Restoration Ecology](https://www.researchgate.net/publication/40777417_Foundations_of_Restoration_Ecology). You may need to create an account to download it.

- *Writing Scientific Research Articles*. THIRD EDITION. M Cargill and P. O'Connor, Wiley-Blackwell. This text is available for purchase at the bookstore.
- Additional readings from the contemporary scientific literature, which are posted on Moodle (UM's Online Course Supplement) in the "Assigned Reading" course topic. Please let the instructors know as soon as possible if there is an issue with one of the posted files. If you need technical assistance with Moodle, you can send the support team an email at courseware-support@umontana.edu, call 243-4999, or visit the [Tech Support Website](#).
- Students interested in delving more deeply into aspects of restoration can find reference information within *The Science and Practice of Ecological Restoration* book series, published by Island Press. The course instructor has a copy of all the books in the series.

Reading Assignments

Staying current with assigned reading is essential to succeed. To help maximize learning from reading assignments, a "Guided Reading Questions" Worksheet will be posted on Moodle ("Assigned Reading" topic area) the week before each reading assignment is due. Students should answer the questions in these worksheets as part of their notetaking for each reading assignment. The first Guided Reading Questions Worksheet must be submitted to Moodle. It will be reviewed and feedback will be provided so that students understand the level of detail expected. For the rest of the semester, students will NOT submit their responses to Moodle and no feedback will be provided. However, at the start of each "lecture" class session: 1) there will be a micro-quiz (see below) and 2) one to two students will be randomly selected to briefly (ca. 3-5 min) share their perspectives on the reading. In addition, during the class period before the exam, students will have the opportunity to lead a small-group discussion on their responses to one or more of the "Guided Question Worksheets", as part of preparing for the exam.

Evaluation and Graded Assignments

This course is offered as traditional letter grade only. Students cannot change to credit/no credit at any time during the semester.

Letter grades will be assigned based on students' numeric scores as follows:

A = ≥ 94%	B+ = 87-89%	C+ = 77-79%	D+ = 67-69%	F = <60%
A- = 90-93%	B = 84-86%	C = 74-76%	D = 64-66%	
	B- = 80-83%	C- = 70-73%	D- = 60-63%	

The course includes assessments in 5 areas for undergraduates and 6 for graduate students. For undergraduates the course is scored out of 100 points, so the % of the course for each course component listed in the table below is equivalent to course points; graduate students are graded based on 110 points.

Course component	% of Grade	
	Undergraduates	Graduate students
1. Class preparation and participation	10	9
2. Seminar article critiques (n=2)	24	22
3. Mid-term exam	18	16.5
4. Debate	18	16.5
5. Research paper	30	28
6. Graduate student increment	<i>Not applicable</i>	8
TOTAL	100	100

Each course component is described in general below and, with the exception of “class preparation and participation”, the detailed assignment description is or will be posted in the relevant topic area in Moodle.

1. Class Preparation and Participation (10 course points)

Coming to class prepared to participate is mandatory. Inform the course instructors in advance if you have a legitimate need to miss a class session or assignment. Course points will be assigned for both course preparation and participation as detailed below.

Class preparation is worth 5 course points. Preparation will be evaluated based on micro-quizzes on assigned readings that include open ended, short answer (1-3 sentence) questions, designed to be answered in just a few minutes. The quiz will close 5 minutes after class starts (2:05). There will be 11 micro-quizzes during the semester, each of which is worth 0.5 points. Each student’s lowest micro-quiz score of the semester will be dropped.

Micro-quizzes will be graded as follows:

Performance	Points
Complete credit: all questions are thoughtfully answered	0.50
Partial credit: some, but not all, questions are answered; or all questions are answered but responses don’t demonstrate comprehension	0.35
No credit: no questions are not answered or responses don’t demonstrate comprehension	0.00

Class participation is worth 5 course points and will be evaluated based on class attendance and contributions through the entire semester.

Performance	Points
Attend all class sessions/regularly and thoughtfully contribute to class discussions (live or via chat)	5.0
Attend all class sessions/not a regular active participant in discussions	4.2
Miss up to 2 class sessions/regularly and thoughtfully contribute to class discussions (live or via chat)	4.2
Miss up to 2 class sessions/not a regular active participant	3.8
Miss 3 or more class sessions/regularly and thoughtfully contribute to the class sessions attended (live or via chat)	Variable
Miss 3 or more class sessions/not an active participant	

2. Seminars (24 course points)

This course includes two seminars (12 points each) during which students will apply concepts from course lectures and readings to scientific articles. For each seminar, students will be expected to read a technical article and submit a written critique that: 1) critically evaluates the scientific merits and contributions of the article paying particular attention to whether the data support the conclusions drawn by the author(s), and 2) evaluates the organization, structure and format of the article. Reviews are due at the beginning of each class session during which a seminar will be held. *Please expect to spend 4-5 hours on your review.* A detailed hand-out describing the assignment and expectations will be posted in the “Seminar” topic area of Moodle. During the in-class seminar discussions, students will have the opportunity to share and discuss ideas from their written critiques. Students generally show measurable improvement through the semester in their ability to critique the scientific literature and understanding of the structure of research articles.

3. Mid-term Exam (18 course points)

There will be an essay-style, open-book, mid-term exam. Students must bring a laptop to class for the exam session. Please notify the course instructors if you do not have access to a laptop for the exam and we will make sure to find one you can use.

4. Debates (18 course points)

Students will participate in one of three in-class debates at the end of the semester. Each student will be assigned to a debate team and will have the opportunity to work with their team to go head-to-head debating another team. Prior to their assigned debate, students will work with their team to develop arguments; however, each student will independently write and submit their debate position statements. During the debates in which a student is not debating, students will participate as audience members and evaluators. Class sessions have been set aside for debate teams to prepare for the debates; there should be no need for team members to meet outside of class periods. A detailed hand-out describing expectations will be posted in the Moodle "Debate" topic area after the mid-term exam.

5. Research Paper (30 course points)

Each student will write a research paper that synthesizes literature on a topic and answers one or more research questions (this type of paper is called a "synthetic review"). Several course sessions will be devoted to the process of conducting this type of research, including specific methods for conducting a formal literature search, developing research questions, analyzing data, structuring a paper, and using reference software. In addition to writing a paper, each student in the course will review the first draft of another student's paper. The complete assignment includes multiple steps, with due dates for each step throughout the semester. A detailed hand-out describing the assignments and expectations is posted in the "Research Paper" topic area of Moodle.

6. Graduate Increment (graduate students only; 10 points)

Graduate students will conduct an additional assignment related to the course debate: writing an annotated bibliography on their assigned debate topic that includes at least **10 references**, to be submitted the class session before the first scheduled debate. This annotated bibliography should include articles related to both the "pro" and "con" perspectives on their debate topic. For each article, the student must provide a brief (ca. 300-500 word) assessment of the authors' arguments related to the pros and cons of the debate topic.

Learning objectives of this increment include: 1) advanced training in critical analysis of opposing scientific viewpoints, and 2) application of concepts from the scientific literature to developing ecological arguments.

General Course Guidelines

Course accommodations due to illness or other unexpected life situations

If you are experiencing an unexpected life circumstance that is affecting your academic program, due to illness or other factors, please do not be shy about communicating so the instructor can help. Accommodations will be provided on a case-by-case basis. Definitely ask if you need support.

Disability modification

If you are a student with a disability and wish to request reasonable accommodations for this course, contact the course professor privately to discuss the specific modifications. You will need to provide a verification letter from the Office of Disability Equity. If you have not yet registered with Disability Services, located in Lommasson Center 154, please do so in order to coordinate your reasonable modifications. For more information, visit the website for the [Office of Disability Equity](#)

Assignment due dates

Assignments must be completed and submitted at the beginning of class on the day the assignment is due, unless the course schedule states otherwise. If you are aware of a conflict with an assignment due date, please contact the course professor by the second week of the semester to arrange an accommodation. Late assignments will not be accepted without prior arrangement.

Moodle organization: how to find your way around

The course Moodle has been set up by assignment type rather than by week of the semester. The first Moodle “topic area” includes the course information (zoom links), and the syllabus and course schedule. The second topic, “lecture notes and resources” is where PDFs of class lectures will be posted, along with any resources mentioned in lecture. The third topic area is where all the assigned readings and “Guided Reading Questions” worksheets will be posted. The fourth is the “Research Paper” topic (which includes all the components of the Research Paper Assignment), and the fifth is “Seminars.” Just before the Midterm, two additional topic areas will be added: “Midterm Exam” and “Debates”.

Please make sure you take the time to navigate Moodle as soon as possible, so that you are aware of where to find all course materials.

Assignment submission

All assignments should be uploaded to the relevant course topic area in Moodle.

Please make sure to:

1. Include your 790# on the first page of each assignment you submit. *Do NOT include your name.* That will help avoid any potential bias in evaluation. The one exception to this rule is the research paper. Since we will be discussing your research papers, there is no way to have an anonymous grading system. Include your 790# and your name on your research paper.
2. Include your 790# in the title of each file you upload to Moodle. Again, do NOT include your name in the file title. The one exception is your draft research paper: see instructions for file naming in the Research Paper Assignment handout.

Communication

All official course communications outside of class will be sent to students’ University of Montana email accounts. It is your responsibility to regularly check your University email. In general, the instructors will aim to respond to emails within 24 hours during the business week, but as a rule will not respond to email sent over the weekend. If your email is not returned after 36 hours (excepting weekends), please resend it, as it may have gotten lost in the email stack.

Class attendance policies

Students who are registered for a course but do not attend the first two class meetings may be required by the instructor to drop the course. This rule allows for early identification of class vacancies to permit other students to add classes. Students who are required to drop due to lack of attendance must complete a drop form or drop the course through CyberBear to avoid receiving a failing grade. Students who know they will be absent should contact the instructor in advance.

Students are expected to attend all class meetings. Occasional absences due to illness, injury, family emergency, religious observance, participation in a University sponsored activity (e.g., field trips, ASUM service, music or drama performances, and intercollegiate athletics), military service or mandatory public service will be excused without penalty. Please inform the instructor as soon as possible if you need to miss a class. Unexcused absences will result in lost participation points (see evaluation section above).

Classroom environment

Students at University of Montana are diverse in many ways, including race, gender, age, religion, preparedness, and mobility. Please help create a respectful learning environment by honoring all student contributions and expressing your views in ways that do not diminish other students’ perspectives.

Plagiarism

All students must practice academic honesty, including taking care not to plagiarize the words or ideas of others (i.e. submitting a direct quotation from a source without using quotation marks and citing the original document; or submitting text based on someone else's ideas without proper citation). 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 on line at: [Student Conduct Code Web Page](#).

The penalty for plagiarism in this course is zero credit on the plagiarized assignment, in addition to any consequences per the Student Conduct Code.