NRSM 265: Elements of Ecological Restoration

**Time:** Tuesday, Thursday, 12:30 – 1:50 pm  
**Location:** Phyllis J. Washington College of Education 312  
**Required Field Trip:** Students must attend at least one field trip, TBD for Sep. and Oct.  
**Moodle for calendar, readings, assignments, and assignment submission**

This course is team taught by faculty within the Ecosystem Science and Restoration program and is supported by a teaching assistant. Please email them (with “NRSM 265” in the subject line) to ask questions or make an appointment.

**INSTRUCTORS**

Diana Six, Professor  
Office: BRB 104  
Office Hrs: Mon & Tues 10:30-11:30 am or by appointment  
E-mail: diana.six@umontana.edu

Lisa Eby, Professor  
Office: BRB 103  
Office Hrs: Mon & Wed 1:00-2:00 pm or by appointment  
E-mail: lisa.eby@umontana.edu

**TEACHING ASSISTANT**

Rebecca Durham, Graduate Student  
Office Hrs: Thurs 11-12 BRB 104  
E-mail: rebecca.durham@umontana.edu

**Zoom personal meeting link:** [https://umontana.zoom.us/my/lisa.eby](https://umontana.zoom.us/my/lisa.eby)

**COVID – Class will meet in person. Masks are required.** We will follow Franke College of Forestry and Conservation and UM guidelines which may shift over time, so please check your email often for guidance. If you are sick, quarantining, and/or have been exposed to COVID, contact the TA via email at least 1 hour prior to missed classes and let us know so we can keep you up to date with course material.

**General:**

- Mask use is required within the classroom or laboratory.
- If you feel sick and/or are exhibiting COVID-19 symptoms, please don’t come to class and contact the Curry Health Center at (406) 243-4330.
- If you are required to isolate or quarantine, you will receive support in the class to ensure continued academic progress. (Add specific information about how you, as the instructor, will continue providing course materials to students in quarantine or isolation.)
- (If instructors are comfortable sharing or including this) UM recommends students get the COVID-19 vaccine. Please direct your questions or concerns about vaccines to Curry Health Center.
• Where social distancing (maintaining consistent 6 feet between individuals) is not possible, specific seating arrangements will be used to support contact tracing efforts.
• Class attendance and seating will be recorded to support contact tracing efforts.
• Drinking liquids and eating food is discouraged within the classroom.
• (If applicable) Mask use is required in vehicles when traveling to field sites as part of class/fieldwork.
• (If applicable) Please note this class is being recorded. Notifying students is a requirement if this is the case.

COURSE OVERVIEW

The complex challenges involved with restoring degraded ecosystems requires an understanding not only of the science of restoration ecology, but also the management practices and social factors that lead to successful project implementation. This interdisciplinary course is designed to give students an overview of the natural and social elements of ecological restoration. Topics covered include the ecological foundations of restoration, restoration goals and practices in terrestrial and aquatic habitats, social perspectives on restoration, restoration policies and planning, and restoration initiatives in Montana and the United States.

Learning Objectives

By the end of this course, students should be able to:
1. Communicate the definition of ecological restoration and its relationship with other disciplines.
2. Describe the scientific principles and management practices used to assist in the repair of forest, grassland, and aquatic systems.
3. Describe some of the human dimensions of restoration.
4. Express concepts of ecological restoration in verbal and written formats.

Textbook and Readings

The assigned readings are from the scientific literature and book chapters. All reading materials will be available through Moodle.


Moodle and Computer Access

You need reliable internet access to keep up to date with course materials, to successfully access and hand in assignments, and to access course readings via Moodle. All course communications outside of class will be sent to students’ University of Montana email accounts. It is your responsibility to regularly check your university account.
Assignments and Assessments

Reading assignments
Each section and class period has associated reading material that should be read before class. Please download all reading materials at the beginning of each course section to ensure that you have access to the documents when you need them.

Quizzes and in-class questions
To assist students with staying current with reading materials, there will be quizzes on the reading assignments in class. Each student gets 1 point for attendance and up to 4 points for questions on each quiz.

Exams
Each section will conclude with an exam, which will be conducted in-class and will include: definitions and fill-in-the-blank-style questions (approximately 25% of points); short answer questions (approximately 50% of points); and questions that require critical thinking and/or application (approximately 25% of points). Students should review all the lectures and readings for each section. In addition, a study guide reflecting potential questions will be provided to help students focus their studying near the end of each section.

Field trips
The course includes at least two field trips, one associated with forest restoration and one with stream and river restoration. Field trip details and dates will be provided in the first two weeks of the semester. You are required to attend at least one of these trips and to submit a field trip report. Details will be provided in a field trip folder on Moodle. You only need to complete one field trip assignment, but you are welcome to attend both field trips.

Writing assignments
There will be written assignments. Detailed information on each assignment will be posted on Moodle. All assignments must be submitted via Moodle.

1. Field Trip Report: Each student is required to submit a report from one of the field trips. Please read through the assignment before the field trip, so that you maximize learning while on the trip and are fully prepared for to write the field trip report.

2. Seminar Report: At the end of the semester, students will participate in an in-class discussion of assigned readings from Federici (2006) and a reflection piece linking class concepts to the readings. Instructions on how to write this assignment and participate effectively in the seminar discussion will be posted on Moodle.

Format and grading for writing assignments:

- All assignments must be typed (except for in class work).
- Assignments will be graded for both substance and writing; approximately 25% of the grade for each writing assignment will be based on grammar and clarity of writing.
- For every written assignment that you submit, include an appropriately formatted header. The first page should include the title of your paper, the course number, your student ID number [790*], and the date. Each additional page should include your student ID number, the date, and the page number. Students who
do not include all the required header information will be docked one grammar grade (e.g., 3% of total grammar points).

- Use your word processing software’s header feature to create the header; do not simply type the header at the top of the page, as it will float to undesired locations. If you do not know how to use this feature, stop by the writing center or ask the course TA for help.
- Please do NOT write your name on any assignments that you turn in, but be certain your correct student identification number is on it.
- In-text citations and bibliographies must follow the “Author-Date” format. For example, the in-text reference would be: (Jones 2016) if it is a single author, (Jones and Brown 2016) if there are two authors, or (Jones et al. 2016) if there are three or more authors. These references are then listed in a bibliography at the end of the paper in scientific journal form (APA style).
- Before submitting assignments via Moodle, save your document with the following file naming format: “NRSM265_AssignmentName_StudentID#”. For example, the seminar paper should be saved as, “NRSM265_SeminarPaper_790123456”

Course Grade

Student grades will be determined based on scores received for the assessment of each section (exam or report), quizzes and participation in classroom activities, and the field trip reports. The course is scored on a total of 650 points.

<table>
<thead>
<tr>
<th>Section</th>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1: Restoration Theory</td>
<td>Exam</td>
<td>100</td>
</tr>
<tr>
<td>Section 2: Forest Restoration</td>
<td>Exam</td>
<td>100</td>
</tr>
<tr>
<td>Section 3: River Restoration and Human</td>
<td>Exam</td>
<td>100</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
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<tr>
<td>Section 4: Grassland Restoration</td>
<td>Exam</td>
<td>100</td>
</tr>
<tr>
<td>Throughout the course</td>
<td>Quizzes, attendance, classroom activities</td>
<td>100</td>
</tr>
<tr>
<td>Throughout the course</td>
<td>Field Trip Report</td>
<td>50</td>
</tr>
<tr>
<td>End of course</td>
<td>Seminar Report</td>
<td>100</td>
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<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>650</strong></td>
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*NOTE: The fourth exam is during finals week but is not cumulative! (it is like a midterm and similar in length)*

Letter grades will be assigned bases on students’ numeric scores as follows:

- A = 94% - 100%
- A- = 90-93%
- B+ = 87-89%
- B = 84-86%
- B- = 80-83%
- C+ = 77-79%
- C = 74-76%
- C- = 70-73%
- D+ = 67-69%
- D = 64-66%
- D- = 60-63%
- F = <60%
COURSE POLICIES

Class expectations

Cell phones and computers
Please turn off electronic devices during class, unless they are being used for an in-class exercise. We expect that you will NOT to be texting, browsing, or checking e-mail during class. If you need to engage with your electronic device, please leave the classroom.

Attendance
In-person attendance is expected and contributes to the “Class participation” portion of your course grade. Absences are not excused unless you have extenuating circumstances and have contacted an instructor in advance of the class (48 hours).

Assignment due dates
Due dates are firm. Late assignments will not be accepted unless you have unusually extenuating circumstances and have made arrangements prior to the due date. This includes missing an exam: there are NO make-up exams without prior arrangement.

We are here to help you succeed. If you have questions or have extenuating circumstances, please reach out to the instructor of the section. We encourage you to do this sooner than you think necessary, as it provides more options. If you have extenuating circumstances (e.g., health, educational conflicts, family, etc.) and contact your instructor at least 48 hours in advance of a due date, we have more options to accommodate student needs.

Communication
We encourage you to communicate with the instructor and/or the TA if you have questions about course material or assignments. If you have questions about your grade or standing in the course, please meet with an instructor during office hours.

Coming to office hours is a great way get questions answered. E-mail can be an effective way to communicate for immediate issues. If you e-mail an instructor or TA, please do the following so that the e-mail is read and understood: (a) include "NRSM 265" in the subject line, (b) write in complete sentences, with proper grammar, and (c) sign the e-mail with your full name. Even though we work to reply promptly, sometimes we are in meetings, classes, and in the field all day and try to catch up on email at night. Reply times will vary and may be up to 48 hours.

Please contact the instructor in charge of the section being covered in the course.

Classroom environment

Students at the 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.

Accessibility

- 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, or visit 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.

Academic honesty, plagiarism, and student conduct

- 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.

- Academic dishonesty of any form is unacceptable and will be taken seriously by the instructor, the College of Forestry and Conservation, and the University of Montana. This includes plagiarism (copying materials from other sources without citing the source or copying someone's work) and cheating (copying material from other students during tests or quizzes). In both cases, you will fail the assignment/exam and the incident will be passed on to the Dean and the Vice Provost of Academic Affairs. It is your responsibility to be familiar with, and adhere to, the University’s definition of plagiarism.

Course withdrawal (and other) deadlines

- See calendar https://www.umt.edu/registrar/calendar/autumn-2021.php

Lecture schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/31</td>
<td>Course overview and introductions</td>
<td>Syllabus</td>
<td>Six, Durham</td>
</tr>
<tr>
<td>1</td>
<td>9/2</td>
<td>What is ecological restoration?</td>
<td>SER Primer</td>
<td>Durham</td>
</tr>
<tr>
<td>2</td>
<td>9/7</td>
<td>Ecological foundations of restoration</td>
<td>Kimmins (1997), SER Primer</td>
<td>Six</td>
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<tr>
<td>2</td>
<td>9/9</td>
<td>Historical ecology and reference sites</td>
<td>Swetnam et al. (1999)</td>
<td>Six</td>
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<tr>
<td>3</td>
<td>9/14</td>
<td>Exam I</td>
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</table>

Section 2: Forest Ecosystem Restoration

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>9/16</td>
<td>Disturbance and fire in forest ecosystems</td>
<td>TBA</td>
<td>Larson</td>
</tr>
<tr>
<td>4</td>
<td>9/23</td>
<td>Fire and restoration</td>
<td>TBA</td>
<td>Hood</td>
</tr>
<tr>
<td>5</td>
<td>9/28</td>
<td>The roles of insects and diseases in forests</td>
<td>Federici</td>
<td>Six</td>
</tr>
<tr>
<td>5</td>
<td>9/30</td>
<td>Restoration considering insects and disease</td>
<td>R.Mtns at Risk</td>
<td>Six</td>
</tr>
<tr>
<td>6</td>
<td>10/5</td>
<td>Class activity – review for exam 2</td>
<td>Study guide</td>
<td>Six</td>
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<tr>
<td>6</td>
<td>10/7</td>
<td>Exam II</td>
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Section 3: River Restoration and Human Dimensions

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>10/12</td>
<td>River ecosystems from local to landscape scales</td>
<td>Hauer et al. (2016)</td>
<td>Eby</td>
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<tr>
<td>7</td>
<td>10/14</td>
<td>Ecological restoration of streams and rivers</td>
<td>Palmer et al. (2005)</td>
<td>Eby</td>
</tr>
</tbody>
</table>
Section 4: Grassland restoration

12 11/16 What is a grassland? Grassland ecology and biocrusts TBA Durham
12 11/18 Invasion biology and invasive plants TBA Pearson
13 11/23 Missoula’s grassland restoration program TBA Valiant
13 11/25 No class--Thanksgiving TBA
14 11/30 Soil biota and restoration Wuba et al. (2016) Lekberg
14 12/2 No class – Field trip make up time TBA
15 12/7 Genetics and restoration TBA Six
15 12/9 Seminar – class discussion Study guide Six, Durham
16 TBA Finals week – Exam IV