Introduction
This course covers the primary ecological theories that inform the practice of ecological restoration, appropriate experimental design for making inference about the efficacy and effects of restoration treatments, and the nuts and bolts of writing a scientific research paper. Topics covered include community assembly, the dynamic nature of ecological systems, biodiversity and ecosystem functioning, ecological resilience, genetic considerations for restoration, and statistical issues and study design. The course has a substantial focus on critical analysis of the content and structure of research papers and best practices for scientific writing.

Prerequisites include at least one advanced undergraduate ecology course and one course in ecological restoration. All pre-requisites must be met prior to enrollment.

Meeting Times
Mondays 2:00-3:50 PM; Wednesday 2:00-2:50 PM.

Meeting Location
FOR 301

Instructor
Dr. Cara R Nelson, Department of Ecosystem and Conservation Sciences, College of Forestry and Conservation. Email: cara.nelson@umontana.edu. Office: 460-C Clapp.
Office hours: Tuesdays 11:00-12:00; Wednesday 3:00-4:00. Please make an appointment if you would like to meet during office hours to ensure that Cara will be available to meet with you. If you are unavailable during office hours, other times to meet can be arranged.

Course Format
This course combines lectures on restoration-relevant ecological theory with seminars and peer-learning activities that allow students to develop skill critiquing, synthesizing, and writing scientific information. The semester will end with three student debates on key topics within restoration ecology.

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
NRSM 465 Restoration Ecology

- 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 academic 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 academic voice necessary for 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 that discipline;
- 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.

**Pedagogy and Expectations for Assignments**
The assignments and expectations for this course are deliberately challenging. As an advanced course, the curriculum requires that students integrate knowledge rather than just memorizing and repeating ideas presented in lecture. As such, course assignments and exams are designed to help students think both broadly about the material covered in class, knowledge gained from other coursework, and relevant work experiences. A commitment to coming to class prepared and eager to discuss ideas, dilemmas and solutions is necessary for success in this course.

Consistent with three credits, this course requires an average of six hours of work per week outside of class time. Please allow enough time in your schedule for course work.

**Writing**
This course is a general education distributed writing (“w”) course for FCFC majors [current proposal]. Roughly 20% of course lectures are devoted to exploring the structure of research articles and best practices for technical writing. Writing assignments include three seminar article
NRSM 465 Restoration Ecology

critiques, a debate position statement, a research paper, and an essay-style mid-term exam. The research paper requires submission of a draft and revision based on feedback from the course instructor and peers. To succeed in the course, students will need to allow time for writing, re-writing, and copy editing. There are services available on campus to assist students who would like additional instruction in developing and improving writing skills (e.g., The Writing Center).

Assignment due dates and submission
Assignments must be uploaded to Moodle at the beginning of class on the due dates listed on the syllabus. Late assignments will not be accepted without prior arrangement, except in emergency situations (which will be evaluated on a case-by-case basis). For most assignments, in addition to Moodle submission, you will need to bring a copy of your work to class to reference during class discussion.

Reading Assignments
Textbooks:

Additional readings will be assigned from the contemporary scientific literature, chapters from books, and popular sources. Reading assignments will be handed out in class or posted on Moodle (UM’s Online Course Supplement) two weeks prior to their due date. 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.

Reference reading – 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 in her office.

Research Paper
Each student will write a ca. 12-20-page paper in which they answer one or more research questions using published literature (i.e. synthesis or meta-analysis). Several course sessions will be devoted to the process of conducting this type of research, specific methods for writing a meta-analysis paper (i.e. a paper based on a literature review), and using reference software. In addition to writing a paper, each student in the course will be expected to review the first drafts of other students’ papers. A detailed hand-out describing the assignments and expectations will be provided.

Deadlines for Research Paper:
- 3/1 (Wednesday): Submit results of literature search (Excel file with list of references).
- 3/15 (Wednesday): Submit results of literature review (Excel data table)
- 4/5 (Wednesday): Submit first draft
- 4/19 (Wednesday): Submit peer review of other students papers
- 5/10 (Wednesday): Submit final draft
NRSM 465 Restoration Ecology

Seminars
This course includes three seminars during which students will apply concepts from course lectures and readings to the scientific literature. For each seminar, students will be expected to read a technical article and submit a written review 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. A detailed hand-out describing the assignment and expectations will be provided.

Mid-term Exam
There will be an essay-style, open-book mid-term exam on Monday, 3/13. Students may elect to take the exam in the classroom (FOR 301) using their own laptop or in the FCFC computer lab in Stone Hall.

Debates
Students will participate in three in-class debates at the end of the semester. Debate topics are: 1) novel ecosystems, 2) genetics and native plant materials, and 3) resilience as a goal for forest restoration. Each student will be assigned to a debate team and will have the opportunity to go head-to-head debating another team in one of the three debates; prior to their assigned debate, students will work in teams to develop arguments and will each independently write and submit a 750-word debate position statement. During the remaining two debates, students will participate as audience members and evaluators. Class sessions have been set aside for debate teams to prepare for the debates. A detailed hand-out describing expectations will be provided.

Evaluation
Students will be evaluated based on their preparation for and performance in all course assignments as well as class attendance and the overall quality of their participation in the course, based on engagement in discussions and course activities.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research paper</td>
<td>37</td>
</tr>
<tr>
<td>Mid-term exam</td>
<td>32</td>
</tr>
<tr>
<td>Seminar article critiques (3)</td>
<td>18</td>
</tr>
<tr>
<td>Debate</td>
<td>10</td>
</tr>
<tr>
<td>Class attendance</td>
<td>1.5</td>
</tr>
<tr>
<td>Participation &amp; contribution</td>
<td>1.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100</td>
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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 bases on students’ numeric scores as follows:

\[
A = \geq 94\%,\ A- = 90-93\%\quad B+ = 87-89\%,\ B = 84-86\%,\ B- = 80-83\%
\]

\[
C+ = 77-79\%,\ C = 74-76\%,\ C- = 70-73\%\quad D = 60-69\%\quad F = <60\%
\]
Graduate Increment
Graduate students will conduct additional assignments related to the course debate worth a total of 12 points (i.e. course will be graded on 112 points: 100 regular points + 12 points for the graduate increment). Specifically, each graduate student will:

- Serve as the leader of a five-to-six person debate group that will develop debate position statements. Debate groups will meet once per week for three weeks of the course. The learning objectives of this activity are: 1) to give graduate students additional experience in organizing collaborative teams, and 2) to give students in-depth experience in orally communicating complex ecological topics. Grades will be assigned based on team-members' evaluations of student performance. 2 points (1.8% of total course grade).

- Write an annotated bibliography on the debate topic that includes at least 16 references to be submitted on March 27th. Learning objectives include: 1) critical analysis of the scientific literature, and 2) application of concepts from the scientific literature to developing ecological arguments. 10 points (8.9% of course grade).

Specific details regarding the assigned activities will be provided in a handout.

General Course Guidelines

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 account. Beware: If your email account is full, you will not be able to send messages (but Griz mail will not tell you that the message has not been sent). In general, instructors try to respond to email within 24 hours during the business week, but as a rule will not respond to email sent over the weekend.

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. 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.

Disability modification
If you are a student with a disability and wish to request reasonable accommodations for this course, contact Cara privately to discuss the specific modifications. You will need to provide a verification letter from Disability Services for Students. 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 Disability Services website at Disability Services Link.

Important dates for dropping this and other courses

<table>
<thead>
<tr>
<th>Deadline</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>15th instructional day</td>
<td>Students can drop classes on CyberBear with refund &amp; no “W” on Transcript</td>
<td>February 10 = last day</td>
</tr>
<tr>
<td>16th to 45th instructional day</td>
<td>A class drop requires a form with instructor and advisor signature, a $10 fee from registrar’s office, student will receive a ‘W’ on transcript, no refund.</td>
<td>February 11 through April 3</td>
</tr>
<tr>
<td>Beginning 46th instructional day</td>
<td>Students are only allowed to drop a class under very limited and unusual circumstances. Not doing well in the class, deciding you are concerned about how the class grade might affect your GPA, deciding you did not want to take the class after all, and similar reasons are not among those limited and unusual circumstances. If you want to drop the class for these sorts of reasons, make sure you do so by the end of the 45th instructional day of the semester. Requests to drop must be signed by the instructor, advisor, and Associate Dean (in that order) and a $10 fee applies. Instructor must indicate whether the individual is Passing or Failing the class at the time of request.</td>
<td>April 4 – May 5</td>
</tr>
</tbody>
</table>
**Course Schedule (Subject to updates during the semester)**

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday 2:00-3:50pm</th>
<th>Wednesday 2:00-2:50pm</th>
</tr>
</thead>
</table>
| Jan 23/25     | Introduction to course and field of restoration ecology | Research Workshop - UM electronic databases (Class will meet in Mansfield Library Student Learning Center, ML 283)  
Reading Assignment: McDonald et al. 2016. |
| Jan 30/Feb 1  | Lecture - Experimental design and inference: key considerations for assessing efficacy and impacts of restoration.  
Reading Assignment: Falk et al. Chapter 13 | Research Workshop - Using literature to conduct research: meta-analysis  
Research Assignments: 1) Read Lawler et al. 2006 and complete worksheet (bring worksheet to class); and 2) Read Cargill and O’Connor 2009, Chapters 2 and 4. |
| Feb 6/8       | Lecture - Community assembly: how can ecological theory inform restoration goals and targets  
Reading Assignment: Falk et al. Chapter 5 | Seminar 1: Experimental design  
Seminar Assignment: Read and critique Albertson et al. 2010 (Submit critique before class via Moodle; bring a copy to use in class) |
| Feb 13/15     | Guest Lecture by Ylva Lekburg: Soil ecology [Cara absent]  
Reading Assignment: TBD | Research Activity: Groups meet to discuss topics  
Research Assignment: Research Paper Development Worksheet with 3 potential topics (Submit Worksheet before class via Moodle; in class, students will have 10 min. to discuss and get feedback on their ideas from their group). |
| Feb 20/22     | *President’s Day - no class*                  | Seminar 2: Community assembly  
Seminar Assignment: Read and critique De Deyn et al. 2003 (Submit critique before class via Moodle; bring a copy to use in class) |
| Feb 27/Mar 1  | Lecture - Ecosystem dynamics: restoration in a changing world  
Reading Assignment: Falk et al. Chapter 15 | Research Workshop: Writing a research paper.  
Research Assignment: 1) Submit via Moodle results of literature searches (list of references); and 2) Read Cargill and O’Connor 2009, Chapter 4 (again). |
| Mar 6/8       | Lecture - Ecosystem dynamics: restoration in a changing world.  
Reading Assignment: Falk et al. Chapter 9 | Seminar 3: Predicted changes in habitat ranges of wildlife species.  
Seminar Assignment: Read and critique Lawler et al. 2009 (Submit critique before class via Moodle; bring a copy to use in class). |
| Mar 13/15     | Midterm Exam (students must elect in advance to take the exam in the Stone Hall Computer Lab) | Research Workshop – 1) Sharing results and 2) cite as you write.  
Research Assignment: 1) Data table (Submit Excel data table before class via Moodle; in class, students will have 5 min. to share results with their group); and 2) Read Cargill and O’Connor 2009, Chapter 8. |
<p>| Mar 20/22     | SPRING BREAK                                 | |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Monday 2:00-3:50pm</th>
<th>Wednesday 2:00-2:50pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 27/29</td>
<td>Lecture: Biodiversity and ecosystem function</td>
<td>Guest Lecture [Alexis Gibson] - Genetic considerations for restoration: Local adaptation and assisted migration</td>
</tr>
<tr>
<td></td>
<td>Debate Activity: Introduction to assignment and initial group meetings</td>
<td><em>Reading Assignment:</em> Falk et al. Chapter 10</td>
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<tr>
<td></td>
<td><em>Reading Assignment:</em> Falk et al. Chapter 10</td>
<td><em>Reading Assignment:</em> Falk et al. Chapter 2</td>
</tr>
<tr>
<td>April 3/5</td>
<td>Debate Activity - Debate groups meet to discuss theme and strategize</td>
<td>Lecture: Prioritizing areas for forest restoration</td>
</tr>
<tr>
<td></td>
<td><em>Reading Assignment:</em> IUCN and WRI 2014.</td>
<td>Research Assignment: Submit first draft of research paper (via Moodle)</td>
</tr>
<tr>
<td>April 10/12</td>
<td>Debate Activity: Debate groups meet to develop arguments.</td>
<td>Guest Lecture [Ric Hauer] - Aquatic ecosystem restoration</td>
</tr>
<tr>
<td></td>
<td><em>Debate Assignment:</em> Develop arguments for your debate</td>
<td><em>Reading Assignment:</em> Palmer et al. 2014</td>
</tr>
<tr>
<td>April 17/19</td>
<td>Debate 1</td>
<td>Research Activity - Peer review of research papers.</td>
</tr>
<tr>
<td></td>
<td><em>Debate Assignment:</em> Position statements due for students presenting in this debate.</td>
<td><em>Research Assignment:</em> Review and critique student research papers</td>
</tr>
<tr>
<td>April 24/26</td>
<td>Debate 2</td>
<td>TBD</td>
</tr>
<tr>
<td></td>
<td><em>Debate Assignment:</em> Position statements due for students presenting in this debate.</td>
<td><em>Assignment:</em> TBD.</td>
</tr>
<tr>
<td>May 1/3</td>
<td>Debate 3</td>
<td>Student evaluation of course</td>
</tr>
<tr>
<td>EXAM WEEK</td>
<td>Research Papers due Wednesday, May 10 at 5:00 PM</td>
<td></td>
</tr>
</tbody>
</table>
Assignment: Research Paper
NRSM465 Restoration Ecology
Spring 2018

Overview—Students will write an independent research paper that answers a restoration-relevant question based on a systematic analysis of the literature. This type of paper is called a review paper. Topics may range from a review of the efficacy or effects of a type of ecological restoration treatment to a review of ecological theory that informs restoration practice. This assignment touches on all the learning objectives of the course (see syllabus) and will require direct application of the concepts covered throughout the semester.

Detailed Assignment and deadlines — This assignment requires developing ideas for a research topic, identifying specific research questions, developing methods for finding literature and for collecting information from that literature to answer the research questions, collecting data, summarizing data in tables and figures, and writing a paper. The specific steps and deadlines are listed below. There will be course lectures devoted to each step.

1. Identifying at least three potential objectives and research questions to be addressed through your literature review and submitting a Research Paper Development Worksheet (due on February 15 at 2:00PM)
2. Conducting literature searches and submitting an Excel file with a list of references that you plan to include in your analysis (due on March 1 at 2:00PM);
3. Reviewing articles and recording data from them in an Excel file (due on March 15 at 2:00PM)
4. Writing a first draft (due on April 5 at 5:00 PM);
5. Reviewing other student papers (undergraduates will review one other paper; graduate students will review 5) and completing a critique (due on April 19 at 2:00PM)
6. Submit your final draft (due on May 10 at 5:00 PM)

Format— There is no page limit for this assignment; however, the expectation is that papers will be be 12-20 pages, NOT including appendices. All students MUST use reference software to organize citations and “cite-while-you-write.” Training will be provided. Students must submit their paper as a text file (i.e. not a PDF).

Paper must include the following (in this order):

- **Title:** A brief title (not more than 18 words) that reflects the both the objectives and scope of the review
- **Abstract:** A brief (not more than 350 words) summary of your research and primary findings.
- **Introduction:** An overview of the broad context, gap in information, and contribution and specific objectives of your work. The last paragraph of the introduction should include a statement of how your research relates to other work in the field and a clear, complete, and logically arranged statement of the specific research questions your review will address.
- **Methods:** A description of the methods that will be used, including the search terms that were used for identifying papers, procedures for excluding articles, data collection methods, and methods used for data analysis (statistical analysis is not required).
- **Results:** A statement of the findings, with figures and tables
- **Discussion:** A discussion of the findings
- **References:** In-text citations and bibliographies following the ESA journal style
- **Appendices:** Data collection tables
**Evaluation**— This assignment is worth 37 points. Student peer-review of another student’s paper is worth 2 points, and the final paper is worth 35 points. Intermediate assignment components (Steps 1-5 above) will not be graded. Two points will be deducted, however, for each assignment component that is submitted after the deadline listed above, except for the draft paper and final paper. For draft papers, four points will be deducted if submitted late. No late final papers will be accepted. Exceptions to the deadlines may be made in emergency situations. In addition, students may request an extension for assignment deadlines at the beginning of the course if there is a legitimate need for an accommodation.

**Grading rubric for final papers (Total = 35 points)**

<table>
<thead>
<tr>
<th>Section</th>
<th>Scientific content</th>
<th>Format and structure of the article</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>1 point – points awarded based on the extent to which the title adequately conveys the content of the paper and conforms to the word limit.</td>
<td></td>
</tr>
<tr>
<td>Abstract</td>
<td>2 points – points awarded based on the extent to which the abstract includes all required information (broad context, gap in information, approach used, primary findings, and relevance), is compelling, and is within the required word limit.</td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>3 pts – points awarded based on the quality of the scientific information, including the extent to which experimental variables have been explained and there is a defensible scientific rationale in the market pitch.</td>
<td>3 pts – points awarded based on the extent to which the paper includes the key components of an introduction: broad context, gap in information, and specific contribution of the article at the start of the article (first and second paragraphs); how the article is different from previous studies (last or second to last paragraph); and specific research questions (last paragraph).</td>
</tr>
<tr>
<td>Methods</td>
<td>3 pts – points awarded based on the adequacy of the methods used for answering the questions posed.</td>
<td>3 pts – points awarded based on the structure and completeness of the presentation of methods.</td>
</tr>
<tr>
<td>Results</td>
<td>3 pts – points awarded based on the strength of the scientific story told through the results.</td>
<td>3 pts – points awarded based on the structure and completeness of the presentation of the results (including the adequacy of figure legends and figure and table captions).</td>
</tr>
<tr>
<td>Discussion</td>
<td>3 pts – points awarded based on the adequacy of the scientific inference from results and presentation of limitations to inference.</td>
<td>3 pts – points awarded based on the structure and completeness of the discussion, including inclusion of broad context (first paragraph), primary findings, and limitations to inference.</td>
</tr>
<tr>
<td>Appendices</td>
<td></td>
<td>1 pts – points awarded based on the inclusion and formatting of data tables as appendices.</td>
</tr>
<tr>
<td>Formatting</td>
<td>2 pts – Points awarded based on appropriate use of headers and footers, page numbers, title of the file submitted, cite-while-you-write software, and ESA-style in-text citations and references</td>
<td></td>
</tr>
<tr>
<td>Clarity of the writing</td>
<td>5 pts – Points awarded based on the clarity of the writing, grammar and style.</td>
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</table>
Assignment: In-class Debate  
NRSM465 Restoration Ecology - Spring 2018

Overview: Classroom debates allow students to strengthen skills in developing scientific arguments from ideas in the literature, critical thinking, writing and oral presentation. During the last three weeks of this course, students will participate in three 45-minute-long debates. Debate topics and position statements are outlined below. Nine to 10 students will participate in each debate, with 4-5 students on each team (pro vs con). Teams will be the same as the teams used for group activities throughout the semester. In class on Monday, March 27, students will have the opportunity to discuss debate topics and rank their preferences. Group preferences will be taken into account when topics and positions are assigned to students. If more than one group selects a topic and position as a first choice, the decision on which group to assign the position and topic will be made using a random process. Assignments of topics and positions to teams will be finalized by Wednesday, March 29.

All team members are expected to participate in the research, development, and presentation of the team’s debate position. Preparation will require research, reading, and writing. Class on Monday April 3 and 10 will be devoted entirely to student groups working on debate preparation.

Each individual will write an initial position statement and submit it to Moodle before class on the day of their debate. Position statements are worth 10 course points. The statements must be limited to 750 words (the approximate length of a 6-minute presentation; 130 words per minute is a rule of thumb) and should include citations to at least 10 references and a bibliography formatted in the ESA journal style (same style as the research paper). Students must use reference software (RefWorks or EndNote or other software) for in-text citations and creation of bibliographies. Although each student will submit an individual statement, each team will select one student to present the opening statement for their team. This team opening statement can be based on a single student’s statement of a combination of statements from two or more team members.

Students individual debate statements will be graded based on the following: the number and strength of the arguments raised in support of their debate position, use of the scientific literature and clarity of the writing.

Although each student’s debate statement will be graded, each team’s debate performance will not be tied to course points. Instead, debate winners will receive bragging rights as well as a prize. Debates will be scored by the course instructor and the audience based on the number of points raised and the strength of the argument (and references to the literature) for each point.

Debate Topics

What is the most appropriate genetic material for restoration of native plants in a changing world?

- **PRO:** Use of locally adapted plant material is generally the best choice for ecological restoration.
- **CON:** Locally adapted plant material often may NOT be the best choice for restoration.
**Is resilience a suitable goal for ecological restoration?**
- **PRO:** Resilience is appropriate goal for ecological restoration
- **CON:** Resilience is NOT an appropriate goal for ecological restoration

**Is the concept of novel ecosystems useful for improving ecological restoration?**
- **PRO:** Identifying novel ecosystems can improve ecosystem management and restoration.
- **CON:** The concept of novel ecosystems is a threat to the field of ecological restoration.

**Debate Format**
The debate will use Education World’s format for classroom debates (http://www.educationworld.com/a_lesson/lesson/lesson304b.shtml) and will include a set of timed presentations alternating with group workperiods. The format will not follow all formal rules of debating.

Initial position statement (6 min. each)
- Position Statement- Pro
- Position Presentation - Con

Work period (5 min)
Rebuttal (4 minutes each)
- Rebuttal - Pro
- Rebuttal - Con

Work Period (3 min)
Response (2 min)
- Response - Pro
- Response - Con

Work Period (2 min)
Position Summary (2 min)
- Position Summary - Pro or Con
- Position Summary - Pro or Con

5 minute Tallying of Ballots/Announcement of Winner

**Debate Procedure**

Prior to the beginning of the class period, both teams will sit at desks facing each other at the front of the room. Each team is to write its debate position and debate position statement on the board behind their desks.
Team members will speak from their desks. Audiovisuals may be used at any time, including, but not limited to handouts, flipcharts, transparencies, slides, audio and videotapes, etc. While a team is not required to use all of the time allocated to each debate component, speakers must stop immediately when the allocated time runs out. Team members are prohibited from speaking to the audience or opposing team except at the times specifically allocated to them. Thus, there can be no immediate, reciprocal interchange of comments between the teams. The sequence of the position summaries will be determined by a random procedure at the conclusion of the final work period. Note that no new information may be introduced during the summary. Doing so may result in disqualification of the offending group. If either team feels that their opponents are introducing new information during the summary, they may challenge them immediately and request a ruling from the instructor.

Selection of Winner(s) and Allocation of Points

The instructor reserves the right to allocate fewer than the default or class voted points to a group, if, in his opinion, the quality of preparation and/or presentation was inadequate.

Debate "winners" will be selected as follows:

Audience Vote: Class members in the audience will vote by secret ballot for a debate winner. Class votes will account for 75% of the score for each team. Votes are to be based upon presentation quality only, and not upon personal agreement or disagreement with the position espoused. At the conclusion of each component of the debate, class members will be asked to assign a point rating along with explanatory comments to each team for their performance during that component. When the debate is over, the point ratings will be summed. Whichever team has the higher sum will be the winner on that ballot.

Instructors' Vote: The instructor will also evaluate both teams according to the above procedures and criteria, and select his choice for the winner. The team of her choice will receive 25% of votes. In the event of a tie, the instructor’s vote will decide the winner.

After all ballots are collected, the number of votes for each team will be announced. Whichever team has more votes will be the winner.
Assignment: Seminar Article Critique
NRSM465 Restoration Ecology
Spring 2018

Learning objective: The goal of the Seminar Article Critique is to have students apply concepts presented in class to the scientific literature. Identifying the extent to which published articles do or do not conform to best practices for scientific inference and for scientific writing will reinforce ideas presented in lecture. Specific learning objectives include examining the principles of scientific inference and critically apply these principles to ecological theory and restoration practice; and exploring the structure of research articles and scientific writing.

Assignment overview, due dates, and articles: There will be three in-class seminars (see table below for dates and articles). Prior to each seminar, each student will write a “Seminar Article Critique”. The Critique will involve carefully reading the assigned article (students should plan to read articles several times to fully digest the content) and writing answers to the questions below. Your answers should be based primarily on lecture material and course readings. Make sure to look up all terms and/or concepts that you do not understand, EXCEPT statistical procedures (you will not be expected to understand statistical methods).

Turn in your critique via Moodle before class on the due date listed below AND bring a copy to class to reference. During class, we will discuss as a group the scientific content and structure and quality of writing of each article.

<table>
<thead>
<tr>
<th>Seminar</th>
<th>Class Date</th>
<th>Article</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>February 8</td>
<td>Albertson et al. 2010</td>
</tr>
<tr>
<td>2</td>
<td>February 22</td>
<td>De Deyn et al. 2003</td>
</tr>
<tr>
<td>3</td>
<td>March 8</td>
<td>Lawler et al. 2009</td>
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Seminar Critique Questions: Please critique each section of the seminar article based on the questions below; for each section and question, make sure to comment on both the scientific merit and the writing and structure of the article.

Introduction

1. Describe and critique the authors statement of the broad context of the study (what is interesting about this work), specific niche (problem that the study will solve), and specific objectives.
2. Evaluate the strength of the “market pitch”. Were you convinced of the importance of the study?

3. Describe and critique the authors’ research questions?

4. Comment on the topics presented in the body of the introduction (in between the first and last paragraphs).

Methods

1. Describe and critique the study design (experiment, observational study or something else) used to address objectives/ research questions, including replication, sampling strategy, and data collected.

2. For each research question or objective, describe the general approach used to analyze the data (you do NOT need to state the specific statistics used, rather just state what was being compared or assessed).

Results and discussion

1. For each research question or objective, state: the primary results, how these results were displayed and whether the presentation of results was clear. If any results were unclear, what could have been improved?

2. Describe and critique the inference that the authors’ made from their results. Are the authors’ conclusions justified based on their methods and results? Was the presentation of the discussion clear?

Contribution and overall merit

1. Did the authors convince you that this article is a novel contribution to science? If so, in what way? If not, why not? Describe at least one implication of this study for restoration.

2. What is your overall assessment of the format and structure of the article and the clarity of the writing. Describe at least one suggestion for improvement.

Future research

1. Describe at least one follow-up research idea that would build on this study’s findings.
**Grading rubric**

Total points = 6

<table>
<thead>
<tr>
<th>Section</th>
<th>Substantive issues related to scientific content</th>
<th>Issues related to the format and structure of the article.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>0.75 pts – points awarded based on the quality of student assessment of the ecological arguments in the introduction of the article, including the extent to which experimental variables have been explained, and the extent to which the authors include a strong ecological argument in their market pitch.</td>
<td>0.75 pts – points awarded based on the quality of student assessment of the extent to which the authors: clearly state the broad context, gap in information, and specific contribution of the article at the start of the article (first and second paragraphs); set their work apart from previous studies; articulate specific research questions; and adequately set up the research questions.</td>
</tr>
<tr>
<td><strong>Methods</strong></td>
<td>0.5 pts – points awarded based on the quality of student assessment of the extent to which the proposed methods are consistent with best practices for designing experiments as presented in course lectures and readings (you do NOT need to evaluate whether the statistical methods are correct) and will allow the authors to answer the questions posed.</td>
<td>0.5 pts – points awarded based on the quality of student assessment of whether the authors have provided the specific methods they will use to assess each of the research questions listed in the introduction and whether the presentation of methods follows the presentation of the questions.</td>
</tr>
<tr>
<td><strong>Results and Discussion</strong></td>
<td>0.75 pts – points awarded based on the quality of student critique of the authors results and inference about the results.</td>
<td>0.75 pts - points awarded based on the quality of student critique of whether the authors have: organized their results and discussion to match research questions and methods; used figures and tables to tell a compelling story; included all required information in figure and table captions and legends.</td>
</tr>
<tr>
<td><strong>Overall merit</strong></td>
<td>0.75 pt- points awarded based on the quality of the overall assessment of the scientific merits of the article.</td>
<td>0.5 pts – points awarded based on the quality of the overall critique of the format and structure of the paper.</td>
</tr>
<tr>
<td><strong>Future research</strong></td>
<td>0.75 pts – Points awarded based on the ecological importance and creativity of student ideas for further research that would advance knowledge related to the authors’ objectives or study area.</td>
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