

ENR5560 – The Dynamics of Ecosystem Restoration

Syllabus (SP23)

Please note that the course leaders reserve the right to alter this syllabus to account for unexpected eventualities such as students joining or dropping the course, illness or other unforeseen events.

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Course Information

- **Course times and location:** The course will run from the 10th January to the 20th April 2023. Meeting times are **Tuesdays and Thursdays between 12:45 and 2:05pm** in Room 370 Kottman Hall.
- **Credit hours:** 3
- **Mode of delivery:** In-person (flipped classroom)

Instructor

- **Name:** Simon Power (he/him)
- **Email:** power.778@osu.edu
- **Office location:** 412A Kottman Hall, 2021 Coffey Road, Columbus OH 43210
- **Office hours:** Tuesdays and Thursdays 11:00am to 12:00pm. [Office hours will be held via Zoom](#)
- **Preferred means of communication:**
 - Please email me directly rather than through Carmen to ensure your messages aren't diverted to spam
 - Class-wide communications will be sent through the Announcements tool in CarmenCanvas. Please check your [notification preferences](#) (go.osu.edu/canvas-notifications) to be sure you receive these messages

Teaching Assistant

- **Name:** Kirsten Packer (she/her)
- **Email:** packer.77@osu.edu
- **Preferred means of communication:** Direct email is preferred over Carmen messaging.

Course Prerequisites

ENR 3800 *and* ENR 4800 *or* grad standing *or* permission of instructor. For those of you who have not completed ENR3800 you are required to read through the [Background and Supplementary Information](#) during the first few weeks of the course. Following this you will be expected to take a quiz on the material. Although not required, we recommend that students have completed EEOB 3410 prior to taking this course.

Course Description

This course will focus on developing students' understanding of how biotic and abiotic conditions influence the response of ecosystems to varying restoration treatments. The course will consider restoration effects on both above and belowground processes to provide students with the grounding to infer how medium to long-term ecological trajectories ensue following restoration. We will examine a range of case study systems from the US and overseas. We will also pay particular attention to important ecosystem management challenges in Ohio and the Midwest. The latter will include the use of fire to restore hardwood forests undergoing "mesophication," and the control of regionally important invasive plants such as honeysuckle, tree of heaven, autumn olive and garlic mustard. We will consider the criteria that are used to assess restoration success including debates over the relative importance of restoration of ecosystem composition versus ecosystem function.

The aims of the course are to:

- Evaluate how abiotic, biotic and disturbance variables interact to drive changes in ecosystems undergoing restoration
- Consider how ecological processes govern the response of ecosystems to restoration actions
- Critically assess what defines restoration "success"
- Introduce interpretation of quantitative approaches to describing ecosystem dynamics
- Develop students' ability to research and critique scientific literature concerning restoration
- Provide a forum for debate on the aims, objectives and practice of restoration

Learning Outcomes

By the end of this course students will be able to:

- Describe a thorough understanding of how variation in disturbances and post-disturbance restoration alters the structure and function of ecosystems
- Scientifically analyze the structure and function of ecosystems undergoing restoration
- Interpret analyses of monitoring and experimental data to assess how a variety of ecosystems respond to restoration challenges.
- Formulate evidence-based strategies for the rehabilitation and restoration of disturbed ecosystems to improve their long-term stability and productivity

Course Schedule

Refer to the CarmenCanvas course for up-to-date due dates.

Weekly course schedule					
WEEK	DATES	ASSIGNMENTS	TOPIC	VIDEO LECTURE	CLASS DISCUSSION
1	10 Jan 12 Jan	Presentation 1	Course Introduction	Bradshaw's Acid Test	Basis for restoration
2	17 Jan 19 Jan	Worksheet (in lieu of Quiz)	Interpreting Statistical Analyses	Reading scientific papers and interpreting results	Interpreting statistical analyses
3	24 Jan 26 Jan	Presentation 2	Invasive Species	FIELD TRIP to OSU Wetlands	Invasive species and ecological fascism
4	31 Jan 2 Feb	Presentation 3 Paper Summary	Targets for Restoration (1)	Paleoecology	Applied historical ecology
5	7 Feb 9 Feb	Quiz Paper Summary	Oak-hickory Forests	Mesophication	The oak bottleneck
6	14 Feb 16 Feb	Quiz Paper Summary	Prairies	Pyric herbivory	Shifting mosaics

7	21 Feb	Quiz	Sagebrush-steppe	Non-equilibrium dynamics	Tracking community trajectories
	23 Feb	Paper Summary		State-transition models	
8	28 Feb	Quiz	Longleaf Pine Forests	Introducing longleaf pine ecosystems	Using undesirable species as a restoration bridge
	2 March	Paper Summary			
9	7 March	Quiz	Targets for Restoration (2)	Reference information	Selecting appropriate reference information
	9 March	Presentation 4			
	9 March	Paper Summary			
10		None	SPRING BREAK		
11	21 March	Quiz	Ponderosa Pine Forests	Restoring fuel structure	Fuel treatment effectiveness
	23 March	Paper Summary			
12	28 March	Quiz	Northern Peatlands	Introduction to peatland ecosystems	Peatland carbon cycling
	30 March	Paper Summary			
13	4 April	Quiz	Traditional Ecological Knowledge	The role of indigenous knowledge in restoration	Biocultural restoration
	6 April	Paper Summary			
14	11 April	Quiz	Targets for Restoration (3)	Applying the "Novel Ecosystem" concept	Novel Ecosystem Debate
	13 April	Presentation 5			
	13 April	Paper Summary			
15	18 April	Quiz	Restoring Wildlife Habitat and Populations	Introduction to the South American savannas	Effects of grazing control on gallery forest habitats
	20 April	Paper Summary			
16		Final Paper Set	NA	NA	NA

How This Course Works

This course will utilize “flipped teaching” to maximize active learning, peer-to-peer communication and opportunities for discussion and debate. Decisions behind restoration treatments are often based on moral and philosophical considerations as well as our scientific knowledge. Gaining skills to interpret, evaluate, present and debate ecological knowledge is essential.

Flipped teaching means that outside the classroom each week you'll watch a video lecture, complete set readings and take a quiz on the material you've learned. In-person class sessions will involve structured discussions and debates regarding the material you've read and group presentations based on an associated activity. **Generally**, each week paper discussions will be held on Tuesdays, then on Thursday you will explain your interpretation of the findings to another group.

Adequate preparation and participation inside and outside the classroom is essential to your and your classmates' success on the course.

Mode of delivery: We will have weekly in-person classes focused on interactive discussion activities. The rest of your work, including video lectures, quizzes, etc. can be found on Carmen and can be completed around your own schedule during the week.

Pace of online activities: This course is divided into **modules** that are released one week ahead of time. Students are expected to keep pace with relevant deadlines but may schedule their efforts freely within the module's time frame.

Credit hours and work expectations: This is a 3 credit-hour course. According to [Ohio State bylaws on instruction](http://go.osu.edu/credithours) (go.osu.edu/credithours), each week students should expect to spend around 2-3 hours on homework per hour of class time if they wish to receive a passing grade.

Research shows regular participation is one of the highest predictors of success. With that in mind, I have the following expectations for everyone's participation:

- **Attendance and participation is a required component of the course:** You are expected to attend in-person classes as well as log in to the Carmen course for online activities (watching video lectures, taking quizzes, accessing the week's reading material). All lectures will be recorded and posted on Carmen prior to class. If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.
- **Office hours:** Attendance at office hours is optional.

Grading and Faculty Response

How Your Grade is Calculated

Table of assignment weights	
Assignment Category	Points
Quizzes	15
Paper Summaries	25
Presentations	25
Final paper	25
Participation	10

Descriptions of Major Course Assignments

Full details for all assignments and submission instructions will be posted on Carmen.

Please notify the instructors if you are unable to attend class due to ill health (or for any other reasonable reason). You will be excused from all assessments for the relevant week(s). Students must however complete at least 60% of each assessment group to complete the course.

Lecture Quizzes 15%

Description: Short multiple-choice quizzes on the video lectures and set readings will be posted on Carmen. **These should be completed by Friday midnight.** Quizzes will be graded out of ten with your two worst scores dropped from calculation of your final grade. In some weeks alternative short assignments may be set in lieu of a quiz. Where no excuse has been provided, each uncompleted quiz will result in a 2% penalty to your final grade.

Paper Summaries 25%

Description: From **Week 4** onwards you will regularly submit **max 500 word** summaries of the paper discussed that week. **These should be completed by Sunday midnight.** This should point to the main findings in the paper and describe the key issues that emerged during class discussions. Your lowest three paper summary scores will be dropped from the calculation of your final grade. Where no excuse has been provided, each uncompleted summary will result in a 2% penalty to your final grade. Read the [associated guidance](#) carefully.

Presentations 25%

Description: At **five points** during the semester (shown in green in the schedule) you will complete group activities related to the discussion topic. This could be a presentation or similar task.

A [generalized rubric for grading](#) student presentations has been provided for guidance although the appropriate content will vary from week to week depending on the specific topic.

Presentations should be given by 2-3 students from the group. **All students must present at least twice during the semester.**

In weeks you present you will be given feedback on your group and combined scores. Presentation scores are not directly equivalent to a grade. Your final grade will be calculated as the average of your two best group scores.

Final paper 25%

Description: Paper questions will be released during the last week of teaching. You will answer one of four essay-type questions. You are expected to research your chosen question and provide an answer that builds on evidence from the **primary literature (e.g., scientific papers, textbooks BUT not news articles)**.

Participation 10%

Description: Each week following the in-class discussions you will submit your completed discussion sheets; these will be evaluated for evidence of engagement in active learning through note-taking and completion of the questions. **Discussion sheets must be submitted on paper at the start of the following Tuesday's class.**

Participation will also be evaluated through a register of class attendance, tracking of student contributions to in-class discussions, and evaluation of engagement with materials provided on Canvas.

Towards the end of the course, peer evaluation will be used to assess students' participation in group activities and ensure that all students have contributed adequately to the completion of each week's activity. Where there is evidence a student has not contributed satisfactorily to a group's work and discussions a penalty of up to 5% may be applied to their final grade.

Where a student has an attendance record < 80% (excluding excused absences) a 5% penalty will be applied to the final grade.

Grading Scale

A (100-93%); A- (92-90%); B+ (89-87%); B (86-83%); B- (82-80%); C+ (79-77%); C (76-73%); C- (72-70%); D+ (69-67%); D (66-60%); E (below 60%).

Graduate students will be expected to perform at a higher level than undergraduates on assignments and will be graded accordingly. Graduate students are expected to take a leadership role in small group discussions, to ensure discussions remain on-track and to co-ordinate group assignments.

Academic integrity and collaboration

The University's degrees and other academic awards are given in recognition of a student's personal achievement. All work submitted by students for assessment is accepted on the understanding that it is the student's own effort.

Plagiarism is defined as the submission or presentation of work, in any form, which is not one's own, without acknowledgement of the sources. Plagiarism includes inappropriate collaboration with others. Special cases of plagiarism can arise from a student using his or her own previous work (termed auto-plagiarism or self-plagiarism). Auto-plagiarism includes using work that has already been submitted for assessment at this University or for any other academic award.

The incorporation of material without formal and proper acknowledgement (even with no deliberate intent to cheat) can constitute plagiarism. Work may be considered to be plagiarized if it consists of:

- a direct quotation;
- a close paraphrase;
- an unacknowledged summary of a source;
- direct copying or transcription.

With regard to essays, reports and dissertations, the rule is: if information or ideas are obtained from any source, that source must be acknowledged according to the appropriate convention in that discipline; and any direct quotation must be placed in quotation marks and the source cited immediately. Any failure to acknowledge adequately or to cite properly other sources in submitted work is plagiarism.

Plagiarism is considered to be an act of fraudulence and can result in a charge of academic misconduct. More information on avoiding plagiarism can be found here: <http://library.osu.edu/projects-initiatives/copyright-resources-center/using-materials/plagiarism>

Late Assignments

Please refer to Carmen for due dates. Quizzes should be submitted by **Friday midnight**. Paper summaries should be submitted by **Sunday midnight**. Students may be granted an extension to a deadline if a good reason is given. Extensions will not be given in retrospect. For all assignments where an extension has not been given, a penalty of 5% per 24 hours (or part thereof) late will be applied, up to a maximum of 5 days after which a grade of zero will be returned. Quizzes cannot be completed late without permission and you will receive a grade of zero for any not completed. Uncompleted quizzes will count towards the two quiz scores which can be dropped (see above) BUT you will receive a penalty to your participation grade for each incomplete quiz.

Instructor Feedback and Response Time

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call [614-688-4357 \(HELP\)](tel:614-688-4357) at any time if you have a technical problem.

- **Preferred contact method:** If you have a question, please contact us first through our Ohio State email addresses. We will reply to emails within **48 working hours and on days when class is in session at the university**.
- **Class announcements:** We will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check [your notification preferences](https://go.osu.edu/canvas-notifications) (go.osu.edu/canvas-notifications) to ensure you receive these messages.
- **Grading and feedback:** For assignments submitted before the due date, we will try to provide feedback and grades within **fourteen days**. Assignments submitted after the due date may have reduced feedback and grades may take longer to be posted.

Extra credit

A maximum of 5 points of extra credit (equivalent to 5% of your final grade) will be awarded to students for

1. Evidence of **participating in relevant additional activities outside the classroom** (e.g. tree planting or invasive removal volunteer events). Normally this can take the form of e-mailing a selfie at, and short-description of, the event concerned. Please be attentive to following appropriate health and safety guidelines and maintain social distancing.

Discussion and Communication Guidelines

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. A more conversational tone is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across as intended. We will provide specific guidance for discussions on controversial or personal topics.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.

Required Materials and/or Technologies

Though this course does not have a textbook the following are the recommended as accompanying texts:

- Hobbs R.J. & Suding K.N. (2013). New Models for Ecosystem Dynamics and Restoration. Washington DC, Island Press.
- Leopold A. (1968) A Sand County Almanac. Oxford, Oxford University Press.
- Howell E.A., Harrington J.A. & Glass S.B. (2010) Introduction to Restoration Ecology. Washington DC, Island Press.
- Williams B.K., Szaro R.C., & Shapiro C.D. (2009) Adaptive Management: The U.S. Department of the Interior Technical Guide. Washington, DC., U.S. Department of the Interior. Available from:
<https://www.doi.gov/sites/doi.gov/files/migrated/ppa/upload/TechGuide.pdf>

Discussion Texts: A set reading will be provided on Carmen each week. An announcement will be made when they are available. The readings will form the basis for subsequent in-class discussions and activities. *It is essential you read the set paper before coming to class.*

Supplementary Materials: Additional papers, reports and multi-media resources relevant to the skills and concepts developed on the course will be provided on Canvas. You are strongly recommended to read them and to consider the results and concepts they discuss. These materials should be taken as a starting point for further reading not as an exhaustive list.

Required Equipment

- **Computer:** current Mac (MacOS) or PC (Windows 10) with high-speed internet connection.
- **Webcam:** built-in or external webcam, fully installed and tested
- **Microphone:** built-in laptop or tablet mic or external microphone
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

If you do not have access to the technology you need to succeed in this class, review options for [technology and internet access](https://go.osu.edu/student-tech-access) (go.osu.edu/student-tech-access).

Required Software

Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Visit the [installing Office 365](https://go.osu.edu/office365help) (go.osu.edu/office365help) help article for full instructions.

CarmenCanvas Access

You will need to use [BuckeyePass](https://buckeyepass.osu.edu) (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device.
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes, good for 365 days, that can each be used once.
- Install the Duo Mobile application on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357 (HELP) and IT support staff will work out a solution with you.

Technology Skills Needed for This Course

- Basic computer and web-browsing skills
- [Navigating CarmenCanvas](https://go.osu.edu/canvasstudent) (go.osu.edu/canvasstudent)
- [CarmenZoom virtual meetings](https://teaching.resources.osu.edu/toolsets/carmenzoom) (https://teaching.resources.osu.edu/toolsets/carmenzoom)
- [Recording a slide presentation with audio narration and recording, editing and uploading video](https://teaching.resources.osu.edu/teaching-topics/best-practices-recording-lecture) (https://teaching.resources.osu.edu/teaching-topics/best-practices-recording-lecture)

Technology Support

For help with your password, university email, CarmenCanvas, or any other technology issues, questions or requests, contact the IT Service Desk, which offers 24-hour support, seven days a week.

- **Self Service and Chat:** osu.edu/it
- **Phone:** [614-688-4357 \(HELP\)](tel:614-688-4357)
- **Email:** servicedesk@osu.edu

Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact:

1. Online reporting form at equity.osu.edu,
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or Email equity@osu.edu

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member."

This course adheres to The Principles of Community adopted by the College of Food, Agricultural, and Environmental Sciences. These principles are located on the Carmen site for this course; and can also be found at <https://go.osu.edu/principlesofcommunity>. For additional information on Diversity, Equity, and Inclusion in CFAES, contact the CFAES Office for Diversity, Equity, and Inclusion (<https://equityandinclusion.cfaes.ohio-state.edu>). If you have been a victim of or a witness to a bias incident, you can report it online and anonymously (if you choose) through the Office of Institutional Equity (<https://equity.osu.edu/>).

Your Mental Health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, [on-demand mental health resources](https://go.osu.edu/ccsondemand) (go.osu.edu/ccsondemand) are available. You can reach an on-call counselor when CCS is closed at [614- 292-5766](tel:614-292-5766). **24-hour emergency help** is available through the [National Suicide Prevention Lifeline website](https://suicidepreventionlifeline.org) (suicidepreventionlifeline.org) or by calling [1-800-273-8255 \(TALK\)](tel:1-800-273-8255). [The Ohio State Wellness app](https://go.osu.edu/wellnessapp) (go.osu.edu/wellnessapp) is also a great resource.

Accessibility Accommodations for Students with Disabilities

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with [Student Life Disability Services \(SLDS\)](#). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's [request process](#), managed by Student Life Disability Services.

Disability Services Contact Information

- Phone: [614-292-3307](tel:614-292-3307)
- Website: slds.osu.edu
- Email: slds@osu.edu
- In person: [Baker Hall 098, 113 W. 12th Avenue](#)

Accessibility of Course Technology

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations as early as possible.

- [CarmenCanvas accessibility](https://osu.edu/canvas-accessibility) (osu.edu/canvas-accessibility)
- Streaming audio and video
- [CarmenZoom accessibility](https://go.osu.edu/zoom-accessibility) (go.osu.edu/zoom-accessibility)

Copyright for Instructional Materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.