

Landscape Ecology

ENVS 410/510, Winter 2024



Course Overview

Landscape ecology is a dynamic discipline that is poised to address current challenges in land management and conservation. The focus of landscape ecology is the reciprocal interactions among spatial patterns and processes at multiple spatial scales. Landscape ecology explores how energy and nutrients flow across spatially variable patches, how dispersal and migration of aquatic and terrestrial organisms are affected by spatial networks, and how disturbances propagate across complex terrain. Grounded in related fields of ecology, geography, and spatial analysis, landscape ecology provides theoretical tools and approaches to guide applied conservation decision-making in a changing world.

Course Objectives

The objective of this course is for students to apply the methods, theories, and practical applications of landscape ecology to inform landscape decision-making. Particular emphasis is placed on how humans modify landscapes and how species, ecological communities, and ecosystems have responded to these changes. Central topics will include scale, pattern quantification, spatial analysis tools (remote sensing), landscape dynamics, restoration, and urban ecology.

Learning Outcomes

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

- Articulate in written and oral form the concepts of scale, pattern, hierarchy, and networks.
- Use the most commonly used tools to describe current patterns in landscapes (GEE and R) and project future changes in landscapes under climate change (iLAND and LANDIS-II).
- Synthesize and critique scientific literature on landscape ecology.
- Apply knowledge of spatial pattern-process interactions to issues of sustainability, conservation, and landscape management.

Course and Instructor Information

CRN: ENVS 410/510

Meeting Times: Tues and Thurs from 4 to 5.20 pm

Instructor: Dr. Melissa Lucash, Research Assistant Professor of Environmental Studies and Geography

Email: Please use Canvas email if possible. If not, use mlucash@uoregon.edu

Office Hours: Tuesdays at 9am; Thursdays at noon

Office Location: Columbia 245

Course materials

You don't need to buy a book! Course materials are freely available online or via the UO library. I will put all the Power Point presentations on Canvas.

Course modality

This is an in-person course and I will not be recording my lectures. We will meet during scheduled class meeting times. I will accommodate absences as described in the Absences policy below. If you need additional flexibility, UO encourages you to consider ASYNC WEB courses. If you need accommodation related to a medical or other disability, you can request those by working with the Accessible Education Center.

Absence policy

This is a face-to-face course. Attendance is important because we will develop our knowledge through in-class activities that require your active engagement. We'll have discussions that will be richer for your presence, and that you won't be able to benefit from if you are not there. Excessive absences make it impossible to learn well and succeed in the course. If you are sick or have a family emergency and cannot attend class, you do not need to email me, and you never need to provide a reason for your absence (per UO policies). I recognize that you may miss one classroom discussion during the term for illness or another critical emergency so I will allow you to drop the grade from one classroom discussion. If you need help catching up in the course due to illness, please come to office hours.

We know our UO community is still navigating COVID-19, and some students will need to isolate and rest if they get COVID. Please take absences when necessary.

Course communications

Class rosters are provided to instructors with students' legal names. Please let me know if the name or pronouns I have for you are not accurate. I want to address you properly. Our class will communicate through our Canvas site using announcements and emails.

Every Tuesday I will post an Announcement that previews critical concepts we'll work on that week and a checklist of the week's due dates. You can also find this information in the overview page in each Canvas module.

When I need to get in touch with individual students, I will do so via Canvas email. When giving feedback on assignments, I do so via Canvas, and turnaround time for feedback is generally one week.

If you want to communicate with me outside of course, it's best to attend office hours (see below) or email me via Canvas email so it doesn't get overshadowed by my other emails. That said, if you don't have access to Canvas email and need to reach me, feel free to use my uoregon email address (mlucash@uoregon.edu). Either way, I try to respond to questions within one business day. I seldom respond to emails after 8pm; I respond sporadically to emails on weekends.

Office hours

I enjoy talking with students about landscape ecology! Wondering how what we're learning relates to current events or career choices? Please be in touch! Please also be in touch to tell me how you are doing in the course. If you are having trouble with some aspect of it, I would like to strategize with you. I believe every student can succeed in this course, and I care about your success. I will host office hours each week and I welcome meetings outside my regular office hours as well. Just email me to set a time. Regardless of the format, I look forward to meeting you in class and/or office hours!

Grading

Discussion presentations (2) = 10 pts

Discussion attendance and participation (6 total, drop lowest score) = 5 pts

Discussion reflections (6 total, drop lowest score) = 15 pts

Assignments (3 labs) = 30 pts

Final proposal = 40 pts

Total = 100 pts

	% of 100
A	92.5-100
A-	89.5-92.4
B+	87.5-89.4
B	81.5-87.4
B-	79.5-81.4
C+	77.5-79.4
C	69.5-77.4
D	59.5-69.4
F	<59.5

Schedule and Readings

L = lecture; D = discussion. *Manuscripts for discussion are in italics.*

<u>Week</u>	<u>Date</u>	<u>Topic</u>	<u>Readings and Assignments Due</u>
		Introduction and Concepts	
1 Tu	January 9	Introduction to Landscape Ecology (L)	
1 Th	January 11	Scale: resolution, extent (L) Introduce Project #1: Classification with Google Earth Engine (A)	Turner chapter 1:1-20
2 Tu	January 16	Hierarchy, Drivers of patterns (L)	Turner, chapter 2
2 Th	January 18	Patterns, Scale, and Hierarchy (D)	<i>Picket 1995, Wiens 1989</i>
3 Tu	January 23	Models of Landscape Change (L)	Turner, chapter 3, PROJECT #1 DUE
3 Th	January 25	Scenarios (L), Models (D)	<i>McBride 2017, Clark 2001</i>
		Ecological Processes	
4 Tu	January 30	Disturbance and Change (L):	Turner chapter 6:175-213, 221-226
4 Th	February 1	Introduce Project #2: Disturbance with iLAND (A)	<i>Seidl 2012</i>
5 Tu	February 6	Dispersal and Migration (L)	Turner, chapter 9: 342-347, Turner chapter 7
5 Th	February 8	Organisms and Spatial Patterns (D)	<i>Thom 2016, Jones 2021</i>
		Social Processes	
6 Tu	February 13	Introduce Final Proposal , Landscape History (L)	Turner chapter 6: 213-221
6 Th	February 15	Landscape Management (D)	<i>Hessburg and Agee 2003 (PNW)</i> , PROJECT #2 DUE
7 Tu	February 20	Introduce Project #3: Management with LANDIS-II (A)	<i>Scheller 2007</i>
		Tools and Applications	
7 Th	February 22	Urban Landscapes (L)	Proposal topic due
8 Tu	February 27	Land Use Change and Fragmentation (D)	<i>Sandel 2013, Fahrig 2017</i>

8 Th	February 29	Networks and Corridors (L)	PROJECT #3 DUE , Goldfarb video
8 Tu	March 5	Land sharing vs sparing (D)	Proposal due Kremen 2018, Betts 2021
9 Th	March 7	Biodiversity (L)	No readings
10 Tu	March 12	Proposal Presentations	
10 Th	March 14	Proposal Presentations	
	March 19	Revised Proposals DUE 10am	

Required Readings

Textbook

Turner, M.G., and Gardner R.H. 2015. Landscape Ecology in Theory and Practice (2nd edition): Pattern and Process. Springer, New York. Available through UO Library as a PDF.

Additional Required Readings (provided as PDFs)

- Betts, M.G., Phalan, B.T., Wolf, C., Baker, S.C., Messier, C., Puettmann, K.J., Green, R., Harris, S.H., Edwards, D.P., Lindenmayer, D.B. and Balmford, A. (2021), Producing wood at least cost to biodiversity: integrating Triad and sharing–sparing approaches to inform forest landscape management. *Biol Rev*, 96: 1301-1317.
- Clark, J.S., Carpenter, S.R., Barber, M., Collins, S., Dobson, A., Foley, J.A., Lodge, D.M., Pascual, M., Pielke, R., Pizer, W. and Pringle, C., 2001. Ecological forecasts: an emerging imperative. *science*, 293(5530), pp.657-660.
- Fahrig, L., 2017. Ecological responses to habitat fragmentation per se. *Annual Review of Ecology, Evolution, and Systematics* 48: 1-23.
- Hannah, L., Flint, L., Syphard, A.D., Moritz, M.A., Buckley, L.B. and McCullough, I.M., 2014. Fine-grain modeling of species' response to climate change: holdouts, stepping-stones, and microrefugia. *Trends in Ecology & Evolution*, 29(7), pp.390-397.
- Hessburg, P. F. and J. K. Agee. 2003. An environmental narrative of Inland Northwest United States forests, 1800–2000. *Forest Ecology and Management* 178:23-59.
- Jones, G., and Tingley, M. 2021 Pyrodiversity and biodiversity: A history, synthesis, and outlook. *Diversity and Distributions*. 28: 386–403.
- Kremen, C., and A. M. Merenlender. 2018. Landscapes that work for biodiversity and people. *Science* 362, eaau6020.
- Lindenmayer, D., R. J. Hobbs, R. Montague-Drake, J. Alexandra, A. Bennett, M. Burgman, P. Cale, A. Calhoun, V. Cramer, P. Cullen, D. Driscoll, L. Fahrig, J. Fischer, J. Franklin, Y. Haila, M. Hunter, P. Gibbons, S. Lake, G. Luck, C. MacGregor, S. McIntyre, R. Mac Nally, A. Manning, J. Miller, H. Mooney, R. Noss, H. Possingham, D. Saunders, F. Schmiegelow, M. Scott, D. Simberloff, T. Sisk, G. Tabor, B. Walker, J. Wiens, J. Woinarski, and E. Zavaleta. 2007. A checklist for ecological management of landscapes for conservation. *Ecology Letters* 11:78-91.
- Pickett, S. T. A. and M. L. Cadenasso. 1995. Landscape ecology: spatial heterogeneity in ecological systems. *Science* 269:331-334.

- Scheller, R. M. 2013. Landscape Modeling. Pages 531-538 in S. A. Levin, editor. Encyclopedia of Biodiversity. Academic Press, Waltham, MA.
- Pickett, S. T. A. and M. L. Cadenasso. 1995. Landscape ecology: spatial heterogeneity in ecological systems. Science 269:331-334.
- Thom, D. and Seidl, R., 2016. Natural disturbance impacts on ecosystem services and biodiversity in temperate and boreal forests. Biological Reviews 91: 760-781.
- Turner, M. G. 2005. Landscape ecology in North America: Past, present, and future. Ecology 86:1967-1974.
- Wiens, J. A. 1989. Spatial scaling in ecology. Functional ecology 3: 385-397.
- Video interview with Ben Goldfarb on networks and corridors.
<https://www.youtube.com/watch?v=7FrHE21xwMM>

Classroom community expectations

All members of the class should:

Participate and Contribute: All students are expected to participate by sharing ideas and contributing to the learning environment. This entails preparing, following instructions, and engaging respectfully and thoughtfully with others. While all students should participate, participation is not just talking, and a range of participation activities support learning. Participation might look like speaking aloud in the full class and in small groups as well as submitting questions prior to class or engaging with Discussion posts.

Expect and Respect Diversity: All classes at the University of Oregon welcome and respect diverse experiences, perspectives, and approaches. We do not want to undermine, demean, or marginalize others based on race, ethnicity, gender, sex, age, sexual orientation, religion, ability, socioeconomic status or anything else. We will value differences and communicate disagreements with respect. As the term progresses, we may establish more specific guidelines and protocols to ensure inclusion and equity for all members of our learning community.

Help Everyone Learn: Part of how we learn together is by learning from one another. To do this effectively, we need to be patient with each other, identify ways we can assist others, and be open-minded to receiving help and feedback from others. Please don't hesitate to contact me to ask for assistance or offer suggestions that might help us learn better.

AI course policy

You may use GenAI tools in this class to help with course work and assignments. Helpful uses include brainstorming ideas, creating outlines, editing, and so forth. However, if you use a GenAI tool, you need to document your use, including the tool you use and when, where, and how in your work process you used it (for example: "I used ChatGPT to generate an outline for my paper, which I then revised before writing my first draft" or "I used slidesAI.io to create the slidedeck style for my presentation." etc.). If you use GenAI, please submit a screenshot of your answer, so I can assess that your submission is your work and not the work solely of GenAI; failure to provide such documentation may result in a grade reduction.

Access and Accommodations

The University of Oregon and I are dedicated to fostering inclusive, equitable, and accessible learning environments for all students. The Accessible Education Center (AEC) assists students with disabilities in reducing barriers in the educational experience. You may be eligible for accommodations for a variety of disabilities – apparent disabilities, such as a mobility or physical disability, or non apparent disabilities, such as chronic illnesses or psychological disabilities. If you have or think you have a disability and experience academic barriers, please contact the Accessible Education Center (Location: 360 Oregon Hall; 541-346-1155; uoaec@uoregon.edu) to discuss appropriate accommodations or support. The details of your disability will be kept confidential with the AEC and you are not expected to share this information with others. However, I invite you to discuss any approved accommodations or access needs at any time with me.

The University of Oregon respects the right of all students to observe their religious holidays, and will make reasonable accommodations, upon request, for these observances. If you need to be absent from a class period this term because of a religious obligation or observance, please fill out the Student Religious Accommodation Request fillable PDF form and send it to me within the first weeks of the course so we can make arrangements in advance.

Need some additional help/resources?

Life at college can be very complicated. You may feel overwhelmed or stressed, experience anxiety or depression, struggle with relationships, or just need help navigating challenges in their life. If you're facing such challenges, you don't need to handle them on your own--there's help and support on campus.

As your instructor if I believe you may need additional support, I will express my concerns, the reasons for them, and refer you to resources that might be helpful. It is not my intention to know the details of what might be bothering you, but simply to let you know I care and that help is available. Getting help is a courageous thing to do—for yourself and those you care about.

University Health Services helps students cope with difficult emotions and life stressors. If you need general resources on coping with stress or want to talk with another student who has been in the same place as you, visit the Duck Nest (located in the EMU on the ground floor) and get help from one of the specially trained Peer Wellness Advocates.

University Counseling Services (UCS) has a team of dedicated staff members to support you with your concerns, many of whom can provide support. All clinical services are free and confidential. Find out more at counseling.uoregon.edu or by calling 541-346-3227 (anytime UCS is closed, the After-Hours Support and Crisis Line is available by calling this same number).

Being able to meet your basic needs is foundational to your success as a student at the University of Oregon. If you are having difficulty affording food, don't have a stable, safe place to live, or are struggling to meet another need, visit the UO Basic Needs Resource

page for information on how to get support. They have information food, housing, healthcare, childcare, transportation, technology, finances (including emergency funds), and legal support. If your need is urgent, please contact the Care and Advocacy Program by calling 541-346-3216, filling out the Community Care and Support form, or by scheduling an appointment with an advocate.

You can expect to be treated with respect in this course. Both students and your instructor enter with many identities, backgrounds, and beliefs. Students of all racial identities, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, citizenship statuses, ability and other visible and non-visible differences belong in and contribute to this class and this discipline. All students are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Academic Integrity

The University Student Conduct Code defines academic misconduct, which includes using unauthorized help on assignments and examinations, the use of sources without acknowledgment, and recording class without “the express written permission of the instructor(s).” Academic misconduct is prohibited at UO. I will report all suspected misconduct to the Office of Student Conduct and Community Standards. If the Office finds a student has committed misconduct, consequences can include of the relevant assignment or exam, or of the course.

While unauthorized help and use of sources without citation is prohibited, learning together and citing sources is crucial! Each assignment and assessment will have a note about whether and how you might work with others so that you can clearly act with academic integrity. If at any point in the term you are unsure about whether a behavior aligns with academic integrity in our course, please contact me. I view student questions about academic integrity as a desire to act with integrity, so I welcome your questions.

Course surveys

The midway and end-of-term Student Experience Surveys will be conducted in class during week four and week 10. These are important opportunities to provide feedback about your learning experiences. I value this feedback and am continually improving the course with students’ responses in mind. The key parts of the survey are the open-ended questions where you share concrete, actionable feedback and about the teaching practices that stand out to you. Thank you for your thoughtful reflections!

Reporting obligations

I am a designated reporter. For information about my reporting obligations as an employee, please see Employee Reporting Obligations on the Office of Investigations and Civil Rights Compliance (OICRC) website. Students experiencing sex or gender-based discrimination, harassment or violence should call the 24-7 hotline 541-346-SAFE [7244] or visit safe.uoregon.edu for help. Students experiencing all forms of prohibited discrimination or harassment may contact the Dean of Students Office at 541-346-3216

or the non-confidential Title IX Coordinator/OICRC at 541-346-3123. Additional resources are available at UO's How to Get Support webpage.

I am also a mandatory reporter of child abuse. Please find more information at Mandatory Reporting of Child Abuse and Neglect.”

Emergencies/ inclement weather

In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by Canvas. If we are not able to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas.

It is generally expected that class will meet unless the University is officially closed for inclement weather. If it becomes necessary to cancel class while the University remains open, this will be announced on Canvas and by email. Updates on inclement weather and closure are also communicated as described on the Inclement Weather webpage.

If I am unable to get to campus due to inclement weather, I will notify you via Canvas and we will meet via Zoom. I have a steep driveway and sometimes can't get to campus if the roads are too slick.