

Instructor: Dr. Andrés Holz, Associate Professor in the Geography Dept.

Office Hours: Wed 11am or by appointment.

Email: andres.holz@pdx.edu (Please don't email me at the CANVAS e-address; it doesn't work correctly)

Grader: Zoie Brauser (MS, ESM).

What is Landscape Ecology?

Landscape ecology is an emerging sub-discipline of ecology that recognizes that many systems—both natural and human—cannot be fully understood outside of their geographic context. Landscape ecology recognizes that spatial patterns and heterogeneous environments are critical factors in understanding how systems work across a range of scales. Landscape ecology provides concepts and theories that incorporate spatial patterning and spatial interactions into the dynamics of complex systems. Landscape ecology has developed robust methods for characterizing spatial patterns and estimating how they might change through time. Fundamental concepts in landscape ecology serve as the foundation for decision-making and problem-solving in applied fields such as conservation biology, land-use management, and urban planning and development. The course is expected to be beneficial to graduate students and advanced undergraduates in geography, natural resources, ecology, conservation biology, landscape architecture, land use planning, and other fields that are interested in sustainability and the benefits of a landscape perspective.

Prerequisites: GEOG 210 (or equivalent) and at least one other 300/400-level biophysical (GEOG, ESM, BIO) course. Students also need to have a working knowledge of **EXCEL**. Although not a formal prerequisite, I strongly encourage students to take 1-2 GIS courses (at least GEOG 488/588 and ideally GEOG 490/590 or GEOG 492/592) and ESM 444/544 (Forest Ecology) before they enroll in Landscape Ecology.

Course Objectives:

- To introduce students to dominant conceptual themes of landscape ecology.
- To explore the principles of landscape ecology as a framework for landscape research, analysis, and management.
- To familiarize students with the breadth of current research trends in landscape ecology.

Learning outcomes:

After taking this class, students should

- Be able to explain how scale mediates our understanding of the world in space and time
- Be able to elaborate on how landscape ecology is well poised to tackle 21st-century global challenges, including climate change, land use change, and urbanization.
- Be able to explain and differentiate the types of models used to understand the ecology of landscapes.

Required textbook and additional readings:

Our text is Landscape Ecology in Theory and Practice: Pattern and Process by M.G. Turner and R.H. Gardner (2015, 2nd Edition, Springer-Verlag, NY). A chapter from the textbook, as well as additional and optional readings, will be available in CANVAS.

Course structure, expectations, and requirements:

- The course format will include a mix of lectures, discussions, group work, presentations, reading and research time, and a final term paper (*see the instructions for the final paper in a separate document in Canvas*).

- All lectures, discussions, group work, and presentations will be conducted in person, unless indicated. Readings and research time will be performed independently.
- Attendance and active participation are required for all class sessions. Students are expected to think critically about the assigned readings and participate in class discussions (see below for detailed expectations).
- **Method of evaluation:**
Grades vary between undergraduate and graduate students. **You will be graded as a graduate student if you are pursuing a Master's degree or higher, regardless of whether you are registered for 418 or 518.** There will not be any opportunities for making up exams or extra credit.

Description	Undergrad (444)	Grad (544)
a) Journal Club Preparation & 1-page report (weekly by Tues evening)	15%	15%
b) Journal Club Participation* (weekly by Wed evening)	45%	35%
c) Labs (2 labs; each 10%)	20%	20%
d) Term Paper (instead of final exam): i-Undergrads – Proposal (3 possible topics by week #3) (5%), 5 peer-review lit review (by week #5; 5%), and completed paper (by week #9; 10%) ii-Grads – Proposal (3 possible topics by week #3) (5%), 5 peer-review lit review (by week #5; 5%), presentation (on week #9; 10%), and completed paper (by week #10; 10%)	20%	30%

** Participation in Wednesday Journal Club in class. Remember, you can only receive full points for in-class participation if you ALSO submit your responses to the "Preparation" discussion board.*

- **Class structure**
 - **During week #1:**
 - I'll lecture on Monday and Wednesday and share the lecture slides and readings ahead of time via Canvas starting on Tuesday in Week 1.
 - **Starting week #2, we will read and discuss peer-reviewed literature**, and the structure of the class will be as follows:
 - **Mondays – Lecture**
 - **Tuesdays (by 9 pm) – Journal Club Preparation**
 - **(Each student) Reads & submits a 1-page report* to the Journal Club Discussion Board in CANVAS.** For full credit, students also need to reply to a post of a student who read the same paper.

- * A **1-Page Report** on the personal notes and impressions of the specifically assigned paper(s); (*see detailed tips and guidelines on how to write the 1-page report in the Instructions document in Canvas*).
- **Grading of the 1-page report will be:** 1 (Not Satisfactory; D), 2 (Satisfactory; B), or 3 (Excellent; A).
- **Wednesdays – Journal Club Participation** (In-Class Discussion) **
 - **Group Activities**
 - **In-Class Group Discussions**
 - **Worksheet - Draft answers to new questions, with (one) group submission (with the name of who participated) in CANVAS (by 9pm)**
 - **Lightning Presentation - main paper's takeaways**

*** Participation in Wednesday Journal Club in class. Remember, you can only receive full points for in-class participation if you ALSO submit your responses to the "Preparation" discussion board.*

**** FREE PASS allows you to miss one of these without penalty**

- **Labs:**
There are two labs scheduled for this course. Labs collaboration with other students is required for Lab 1, and encouraged but not required for Lab 2. The labs typically require 3-5 hours of time outside of the scheduled class period. If the labs are conducted as a small group, only a single grade will be given for the collective group effort.
- **Term Paper Assignment:**
The term paper will be in place of a final exam and will be a term project on a topic that students choose. Students must choose a topic that relates to course material and topics are subject to instructor discussion. **Students need to discuss the term paper topic with Andrés no later than by week #3 either via email and/ or during my office hours (Weds 11 am).** Detailed instructions for the term paper are available in a separate document in Canvas. Note that the assignment is different for undergraduates and graduate students (e.g. it is expected that graduate students will work on a project that is related to their thesis work).
- All lectures, discussions, group work, and presentations will be conducted in person, unless indicated. Readings and research time will be conducted on your own. **Two optional day field trips are scheduled to deepen our landscape ecology understanding on Fridays in Weeks 4 and 8.** We need to find drivers and agree on destination and schedule.
- **Generative AI (GEnAI)**
The use of generative AI tools (e.g. U-M GPT, ChatGPT, Dall-e, etc.) is permitted in this course as long as students disclose it for the following activities:
 - a) Brainstorming and refining your ideas;
 - b) Fine tuning your research questions;
 - c) Finding information on your topic;
 - d) Drafting an outline to organize your thoughts; and
 - e) Checking grammar and style.

The use of generative AI tools is **not permitted in this course for the following activities:**

- a) Impersonating you in classroom contexts.
- b) Completing any Lab assignments.

Our goal as a community of learners is to explore and understand how these tools may be used to augment human performance. However, violation of the explicit disclosure requirement may subject students to standard processes (for reporting, determining academic misconduct (if any), and assigning sanctions (as appropriate) as would be employed for any other type of potential Academic Misconduct.

- **Final Grades:**

All course components will be graded on a percentage basis, adding to 100%. Final grades will be assigned according to the scale below. Upward adjustments to this scale *are possible but unlikely*.

Grade	% of possible points	Grade	% of possible points
A	94.5	C	76.5
A-	91.5	C-	73.5
B+	88.5	D+	70.5
B	85.5	D	67.5
B-	82.5	D-	64.5
C+	79.5	F	Below 64.5

PSU STUDENT RESOURCES AND POLICIES

Please learn about and use the many campus resources available to you via PSU's I Am A Student website: <https://www.pdx.edu/student> and: <https://www.pdx.edu/liberal-arts-sciences/clas-student-success>. These resources are made possible by your tuition and fees.

BASIC NEEDS

BASIC NEEDS HUB

- Get connected to resources in your moment of need, including food assistance, housing and tech access
- Smith Memorial Student Union, Rm. 435
- pdx.edu/dean-student-life/basic-needs-hub

FOOD ASSISTANCE

- **PSU Food Pantry**
 - Smith Memorial Student Union, Rm. 47A
 - <https://psuftp.com/>
- **Free Food Market** on the second Monday of the month
 - South Park Blocks, near Shattuck Hall, 9:30-11 a.m.
 - Bring your own bag

REUSE ROOM

- Acquire (or donate) used school, office and home supplies
- Cramer Hall, Rm. 180; door is always open

SERVICES FOR STUDENTS WITH CHILDREN

- Pick up free diapers, wipes, gently used clothing, breast pumping kits and speak with staff about available resources and childcare
- Smith Memorial Student Union, Rm. 462
- pdx.edu/students-with-children/

ACADEMIC SERVICES

LIBRARY

- Check out laptops, Chromebooks and other equipment
- Take advantage of study spaces and computer labs
- Check out PSU-owned books and media
- library.pdx.edu/services

LEARNING CENTER

- Schedule an appointment with a tutor (in-person or remote) in biology, chemistry, physics, math, stats, econ, and several world languages
- Work with an academic coach to create measurable plans to help you meet your academic goals
- pdx.edu/learning-center

DISABILITY RESOURCE CENTER

- Request accommodations
- Smith Memorial Student Union, Rm. 116
- pdx.edu/disability-resource-center

WRITING CENTER

- Work with a writing consultant (in-person or remote)
- Find writing resources
- pdx.edu/writing-center

HEALTH & WELLNESS

STUDENT HEALTH & COUNSELING

- Counseling, health and dental services under one roof
- Students taking 5+ credits are eligible to use SHAC services regardless of type of health insurance coverage
- University Center Building, Suite 200

MY SSP APP (24/7 MENTAL HEALTH SUPPORT)

- Offering free, confidential mental health and wellbeing support 24/7 via the My SSP app, phone and web
- pdx.edu/health-counseling/my-ssp

CAMPUS REC

- Students taking at least one credit and paying tuition/fees are automatically Campus Rec members
- pdx.edu/recreation



Student Responsibilities: Students are expected to attend all class meetings, complete all readings, and to participate in class discussions and activities. Early exams, make-up exams, and incompletes grades will not be given except in the case of documented family, medical emergencies, or professional obligations related to their academic program.

Requests for Academic Accommodation: Students who have a learning disability that may affect their performance should contact the Disability Resource Center, 116 Smith Memorial Student Union (Phone: 503-725-4150, Email: drc@pdx.edu). Once registered with the Disability Resource Center, students should then meet with me as soon as possible to arrange learning and testing accommodations.

Policy on Academic Honesty: Any type of academically and ethically dishonest work will result in an automatic "F" for the assignment and, when appropriate, a report filed with the Office of Student Affairs. The PSU Bulletin includes the following statement on Academic Honesty: "The Student Conduct Code, which applies to all students, prohibits all forms of academic cheating, fraud, and dishonesty. These acts include, but are not limited to, plagiarism, buying and selling of course assignments and research papers, performing academic assignments (including tests and examinations) for other persons, unauthorized disclosure and receipt of academic information, and other practices commonly understood to be academically dishonest."

Portland State is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment (sexual assault, domestic and dating violence, and gender or sex-based harassment and stalking). If you have experienced any form of gender or sex-based discrimination or harassment, know that help and support are available. PSU has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and on-housing accommodations, helping with legal protective orders, and more. Information about PSU's support services on campus, including confidential services and reporting options, can be found on PSU's Sexual Misconduct Prevention and Response website at: <http://www.pdx.edu/sexual-assault/get-help> or you may call a confidential IPV Advocate at 503-725-5672. You may report any incident of discrimination or discriminatory harassment, including sexual harassment, to either the [Office of Global Diversity and Inclusion](#) (see [Equity and Compliance](#)) or the [Office of the Dean of Student Life](#).

Please be aware that all PSU faculty members and instructors are required to report information of an incident that may constitute prohibited discrimination, including sexual harassment and sexual violence. This means that if you tell me about a situation of sexual harassment or sexual violence that may have violated university policy or student code of conduct, I have to share the information with my supervisor or the University's Title IX Coordinator or the Office of Affirmative Action. For more information about [Title IX](#) please see [this website](#) in the Global Diversity & Inclusion hub.

PSU strives to create a safe campus for our students. To ensure adherence to this community standard, absolutely no act of discrimination towards another individual including physical, verbal, or psychological intimidation or harassment will be tolerated. This includes but is not limited to discrimination based on gender, sexual orientation, race, ethnicity, religious affiliation, or disability. This also includes attempts at humor that are or may be offensive. Please report any such behavior to your professor and appropriate action will be taken.

Course Outline
(The schedule and assigned readings are tentative and subject to change)

Week		Topic(s)	Readings*	Assignments Due (9 pm)
1	Mon Wed	Course Introduction: the landscape perspective Lecture: Concepts and roots of landscape ecology	Textbook Chapter 1 (1-15p); Podcast #1	
2	Mon	Scale and its consequences: The critical issue of scale and scaling in landscape ecology	TxtBChap. 1: Scale and Heterogeneity (pp 15-32)	
	Tues (by 9 pm)		<i>See Individual paper readings in CANVAS</i>	<i>(Each student) Read, Answer Questions & Submit to the Journal Club Discussions Board</i>
	Wed		In-class Group Discussion & Questions	<i>(Each Group) Read, Answer Questions & Submit to the Assignment folder</i>
3	Mon	Causes of landscape patterns: 4 key drivers, legacies, challenges	TxtBChap. Chap. 2: Causes of Landscape Pattern (pp 33-54)	Lab 1
	Tues (by 9 pm)		<i>See Individual paper readings in CANVAS</i>	<i>(Each student) Read, Answer Questions & Submit to the Journal Club Discussions Board</i>
	Wed		In-class Group Discussion & Questions	<i>(Each Group) Read, Answer Questions & Submit to the Assignment folder</i>
	Fri (by 9pm)	Term Paper Proposal		
4	Mon	Quantifying landscape pattern: metrics and statistics	TxtBChap. Chap. 4: Landscape Metrics (pp 97-115)	
	Tues (by 9 pm)		<i>See Individual paper readings in CANVAS</i>	<i>(Each student) Read, Answer Questions & Submit to the Journal Club Discussions Board</i>

	Wed		In-class Group Discussion & Questions	<i>(Each Group) Read, Answer Questions & Submit to the Assignment folder</i>
	Friday	Day Field Trip		
5	Mon	Landscape Disturbance Dynamics	TxtBChap. 6: Land. Disturb Dyn (pp TBD)	
	Tues (by 9 pm)		<i>See Individual paper readings in CANVAS</i>	<i>(Each student) Read, Answer Questions & Submit to the Journal Club Discussions Board</i>
	Wed		In-class Group Discussion & Questions	<i>(Each Group) Read, Answer Questions & Submit to the Assignment folder</i>
	Fri	Term Paper 5-paper literature review		
6	Mon	Ecosystem Ecology and Landscapes	Guest Lecture: Cody Evers (PSU)	Lab 2
	Tues (by 9 pm)		<i>See Individual paper readings in CANVAS</i>	<i>(Each student) Read, Answer Questions & Submit to the Journal Club Discussions Board</i>
	Wed		In-class Group Discussion & Questions	<i>(Each Group) Read, Answer Questions & Submit to the Assignment folder</i>
7	Mon	Metapopulations	Rachel Wheat (OFW)	
	Tues (by 9 pm)		<i>See Individual paper readings in CANVAS</i>	<i>(Each student) Read, Answer Questions & Submit to the Journal Club Discussions Board</i>
	Wed		In-class Group Discussion & Questions	<i>(Each Group) Read, Answer Questions & Submit to the Assignment folder</i>

8	Mon	TBD	TBD	
	Tues (by 9 pm)		<i>See Individual paper readings in CANVAS</i>	<i>(Each student) Read, Answer Questions & Submit to the Journal Club Discussions Board</i>
	Wed		In-class Group Discussion & Questions	<i>(Each Group) Read, Answer Questions & Submit to the Assignment folder</i>
	Fri	Day Field Trip		
9	Mon/Wed: Grad Student Final Paper Presentations			
	<i>Fri (by 7pm)</i>	<i>Undergrads - Final Term Paper</i>		
10	NO CLASS THIS WEEK			
	Fri (by 9pm)	<i>Grads - Final Term Paper</i>		
11	FINAL WEEK (no class this week)			

*Unless specified, the entire class will read the assigned section from a chapter from the textbook, and another specific reading will be assigned to each group of students. Readings groups and assigned papers will be posted in CANVAS. It is expected that all students will come to class having read the readings, in the form of book chapters, media pieces and pre-assigned scientific articles, as we will discuss and present these in class. The textbook readings will introduce the main topic of the week. Starting on week #6, we will have guest lecturers, for which the media pieces will introduce their week's topic and are expected that students read these before the guest lecture.

TENTATIVE Assigned and Optional readings
Fall 2025

FOR WEEK 1

All: The landscape perspective: what is landscape ecology and why do we care?

Turner et al. Chap. 1: Introduction to Landscape Ecology and Scale (pp 1-15)

Mayer et al. 2016. [Podcast: Landscape Ecology and its Role in Policymaking. BioScience.](#)

Groups:

Concepts and roots of landscape ecology

Wiens, J., M. Moss, M. Turner, and D. Mladenoff. 2007. Chap. 1 [The Early Antecedents of Landscape Ecology](#). in *Foundation Papers in Landscape Ecology*. Columbia Univ Press. Pp 4-10.

Wu, J. 2013. Key concepts and research topics in landscape ecology revisited: 30 years after the Allerton Park workshop. *Landscape Ecology* 28:1-11.

Forman, R.T.T. 1995. Some general principles of landscape and regional ecology. *Landscape Ecology* 10:133-142.

Hobbs, R. 1997. Future landscapes and the future of landscape ecology. *Landscape and Urban Planning* 37:1-9.

Pickett, S. T. A. and M. L. Cadenasso. 1995. Landscape ecology: spatial heterogeneity in ecological systems. *Science* 269:331-334.

FOR WEEK 2

All: Scale and its consequences

Turner et al. Chap. 1: Scale and Heterogeneity (pp 15-32)

Groups: The critical issue of scale

Newton, et al. 2009. "Remote Sensing and the Future of Landscape Ecology:" *Progress in Physical Geography*,. <https://doi.org/10.1177/0309133309346882>.

Wiens, J. A. 1989. "Spatial Scaling in Ecology." *Functional Ecology* 3: 385–97.

Newman et al. 2019. Scaling and Complexity in Landscape Ecology.

Levin, Simon A. "The Problem of Pattern and Scale in Ecology." *Ecology* 73, no. 6 (1992): 1943–67.

Swetnam, T. W., C. D. Allen, and J. L. Betancourt. "Applied Historical Ecology: Using the Past to Manage the Future." *Ecol. App.* 9, no. 4 (1999): 1189–1206.

Levin, S.A. 2000. Multiple scales and the maintenance of biodiversity. *Ecosystems* 3(6):498-506.

Wessman, C.A. 1992. Spatial scales and global change: Bridging the gap from plots to GCM grid cells. *Annual Review of Ecology and Systematics* 23:175-200.

Cohen, Warren B., Thomas A. Spies, Ralph J. Alig, Douglas R. Oetter, Thomas K. Maersperger, and Maria Fiorella. "Characterizing 23 Years (1972–95) of Stand Replacement Disturbance in Western Oregon Forests with Landsat Imagery." *Ecosystems* 5, no. 2, 122–37. <https://doi.org/10.1007/s10021-001-0060-X>.

Urban, D.L., R.V. O'Neill, and H.H. Schugart. 1987. Landscape Ecology. *BioScience* 37:119-127.

Kratz, T.K., L.A. Deegan, M.E. Harmon, and W.K. Lauenroth. 2003. Ecological variability in space and time: Insights gained from the US LTER program. *BioScience* 53(1):57-67.

FOR WEEK 3

All: Causes of landscape pattern: The abiotic template

Turner et al. Chap. 2: Causes of Landscape Pattern (pp 33-54)

Groups: Causes of landscape pattern: Biotic and disturbance dynamics

- a) Foster, D.R., D.H. Knight, and J.F. Franklin. 1998. Landscape patterns and legacies resulting from large infrequent forest disturbances. *Ecosystems* 1:497-510.

- b) Swanson FJ, TK Kratz, N Caine, and RG Woodmansee. 1988. Landform effects on ecosystem patterns and processes. *BioScience* 38:92-98.
- c) Kratz et al. 1997. The influence of landscape position on lakes in northern Wisconsin. *Freshwater Biology*
- d) Turner, Monica G. "Disturbance and Landscape Dynamics in a Changing World." *Ecology*, October 14, 2016, 2833–49. [https://doi.org/10.1890/10-0097.1@10.1002/\(ISSN\)1939-9170.MacArthurAward](https://doi.org/10.1890/10-0097.1@10.1002/(ISSN)1939-9170.MacArthurAward).
- e) Irwin, Elena G., and Nancy E. Bockstael. "The Evolution of Urban Sprawl: Evidence of Spatial Heterogeneity and Increasing Land Fragmentation." *Proceedings of the National Academy of Sciences* 104, no. 52 (December 26, 2007): 20672–77. <https://doi.org/10.1073/pnas.0705527105>.
- f) Hermy, V. and K. Verheyen. 2007. Legacies of the past in the present-day forest biodiversity: a review of past land-use effects on forest plant species composition and diversity. *Ecological Research* 22:361-371.

FOR WEEK 4

All: Quantifying landscape pattern: metrics and statistics

Turner et al. Chap. 4: Landscape Metrics (pp 97-115)

Groups: Landscape metric analysis

Li, Harbin, and Jianguo Wu. "Use and Misuse of Landscape Indices." *Landscape Ecology* 19, no. 4 (May 1, 2004): 389–99. <https://doi.org/10.1023/B:LAND.0000030441.15628.d6>.

Kupfer, J. A. 2012. *Landscape ecology and biogeography: Rethinking landscape metrics in a post-FRAGSTATS landscape. Progress in Physical Geography: Earth and Environment* 36:400–420.

Costanza, J. K., K. Riitters, P. Vogt, and J. Wickham. 2019. *Describing and analyzing landscape patterns: where are we now, and where are we going? Landscape Ecology* 34:2049–2055.

Cushman, Samuel A., Kevin McGarigal, and Maile C. Neel. "Parsimony in Landscape Metrics: Strength, Universality, and Consistency." *Ecological Indicators* 8, no. 5 (September 1, 2008): 691–703. <https://doi.org/10.1016/j.ecolind.2007.12.002>.

Riitters, K. H., R. V. O'Neill, C. T. Hunsaker, J. D. Wickham, D. H. Yankee, S. P. Timmins, K. B. Jones, and B. L. Jackson. 1995. A factor analysis of landscape pattern and structure metrics. *Landscape Ecology* 10:23–39.

Optionals

Tyler, M.W. and D.L. Peterson. 2004. Effects of forest policy on landscape pattern of late-seral forest of the Western Olympic Peninsula, Washington. *Agriculture, Ecosystems & Environment* 101(2-3):289-306.

Uuemaa, Evelin, Marc Antrop, Jüri Roosaare, Riho Marja, and Ülo Mander. "Landscape Metrics and Indices: An Overview of Their Use in Landscape Research." *Living Rev. Landscape Res.* 3 (2009). <https://doi.org/10.12942/lrlr-2009-1>.

Coops, N.C., S.N. Gillanders, M.A. Wulder, S.E. Gergel, T. Nelson and N.R. Goodwin. 2010. Assessing changes in forest fragmentation following infestation using time series Landsat imagery. *Forest Ecology and Management* 259(12):2355-2365.

Wagner, H.H., and M.J. Fortin. 2005. Spatial analysis of landscapes: concepts and statistics. *Ecology* 86(8): 1975-1987.

FOR WEEK 5-9

TBD