Instructor: Dr. Andrés Holz, Associate Professor in the School of Earth, Environment and Society, SEES (Geography). Email: <u>andres.holz@pdx.edu</u> (<u>Please don't email me at the CANVAS e-address; it doesn't work properly</u>) Office Hours: Tuesdays @ 2pm or by appointment, either in person or via Zoom (https://pdx.zoom.us/j/88089184031)

What is Forest Ecology?

Forest Ecology explores the foundational theories and principles of forest ecology as a framework for understanding our interactions with forest ecosystems. This is an advanced course for undergraduate majors in environmental science, geography, biology, and environmental studies or a regular elective course for graduate students (MS, MA, EES, and BIO). In this course, students will learn about the major biotic and abiotic factors that influence forest ecosystem structure, function, & diversity and some of the dominant theories of forest ecology through lectures, discussions, group work, reading and research time, presentations (for grad students), and fieldtrips. Lastly, students will complete a Forest Ecology Synthesis Assignment (instead of a final exam; see instructions in a separate document in Canvas).

Prerequisites: Graduate student or junior or senior standing and an ecology lab course beyond the introductory level. Recommended courses: GEOG 313 (Biogeography), BIO 357 (Ecology), ESM 320/321 (Analysis of Environmental Systems), ESM/GEOG 418/518 (Landscape Ecology), GEOG 413/513 (Disturbance Biogeography of the PNW).

Learning outcomes:

- Identify and describe the components of a forest ecosystem, and the factors and processes that underpin variability among forest ecosystems.
- Describe forest disturbance-succession cycles and the resulting changes in forest ecosystem structure and function, including wildlife habitat and ecosystem services.
- Describe and compare stand development pathways occurring in a variety of different forest ecosystems.
- Explain how environmental factors, species interactions, and disturbance regimes influence forest ecosystems above ground and below ground.
- Discuss how different management interventions affect ecological structure, functions, and processes at local and landscape scales.
- Describe scientific theories relevant to forest ecology and ecosystems.
- Integrate concepts of forest ecosystems from a social and ecological perspective.
- Recognize the variety of perspectives that contribute to forest ecology and articulate your own perspective on forest ecology.
- Describe and compare different methods of classifying forest ecosystems and their species.
- Predict how global environmental change can affect forest ecosystems.

Required and optional readings:

<u>Required</u>: All required learning resources are provided within Canvas.

Optional: Background/ optional textbooks provide additional context for the topics we cover in class, including:

- Perry, D.A. et al. 2008. Forest Ecosystems. 2nd Edition. Johns Hopkins University Press. Available as a printed book from the PSU library's course reserve: <u>https://search.library.pdx.edu/permalink/01ALLIANCE_PSU/fvm7lh/alma99124423401853</u>
- Peh, K., *et al.* 2015. *Routledge Handbook of Forest Ecology*. Routledge NY, NY. Available as an e-book from the PSU library: <u>https://search.library.pdx.edu/permalink/f/p82vj0/CP71250765950001451</u>

Course structure, expectations, and requirements:

- The course format will include a mix of lectures, discussions, group work, reading and research time, presentations (for grad students), a Forest Ecology Synthesis Assignment (*see instructions in a separate document in Canvas*), and optional day fieldtrips.
- 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 (weekly by Sun evening)	9%	9%
b) Journal Club Participation* (weekly by Mon evening)	36%	18%
c) Application Activity Prep (weekly by Tues evening)	8%	8%
d) Application Activity Participation* (weekly by Wed evening)	16%	8%
e) Forest Ecology Synthesis Assignments (instead of final exam):		
i-Undergrads – Parts 1 (5%), 2 (15%), and 3 (10%)		
	30%	
ii-Grads – Parts 1 (10%), 2 (15%), and 3 (16%) & Presentation		
(16%)		57%

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

- 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 forest ecology understanding on Fridays in Weeks 4 and 8.
- <u>Attendance and active participation are required for all class sessions</u>. Students are expected to think critically about the assigned readings and participate in class discussions (see below for detailed expectations).

• Weekly structure

- Week 1
 - Monday
 - Intros, overview, and expectations
 - Tuesday
 - Readings and Lecture Prep work
 - Wednesday
 - Lecture
 - Sunday
 - Each student posts prep-answers to the Journal Club Discussions Board in CANVAS by 10pm
- Weeks 2-10*
 - Mondays:
 - In-Class Journal Club Discussions 100 min (Group and Class)
 - You'll be in small "breakout" discussion groups, talking about the assigned paper for the week. At the end of class, we'll all get back together as a group to summarize. Before class, you'll need to read the paper, think through and answer assigned questions, and post your response to the Discussion Board before class. <u>Come to class ready to discuss the paper and how it relates to the ideas presented during the previous lecture (last Wednesday)</u>.
 - Each group submits one set of Discussion answers (by 10pm)
 - Tuesdays:
 - Each student post prep-answers to Applied Activity Board in CANVAS by 10pm
 There will be three sets of groups throughout the term (weeks 1-3; 4-6; 7-10)
 - Lecture Prep work
 - Wednesdays:
 - Applied Activities 50 min
 - Lecture and introductions to the readings 50 min
 - <u>Sunday</u> (Each student post prep-answers to Journal Club Discussions Board in CANVAS by 10pm)

*Schedule following Memorial Day will be slightly different.

• Forest Ecology Synthesis (Term Paper) Assignment:

The Forest Ecology Synthesis will be in place of a final exam. See Detailed Instructions for the Forest Ecology Synthesis in a separate document in Canvas in weeks 1, 3, 6, and 10. Note that the assignment is different for undergraduates and graduate students (e.g., it is encouraged that graduate students work on a

project related to their thesis work and it is expected deeper level of synthesis. See more details in the separate document).

• Generative AI (GEnAI)

The use of generative AI tools (e.g. ChatGPT, Gemini, 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
Α	94.5	С	76.5
A-	91.5	C-	73.5
B+	88.5	D+	70.5
В	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: <u>https://www.pdx.edu/student</u> and: <u>https://www.pdx.edu/liberal-arts-sciences/clas-student-success</u>. These resources are made possible by your tuition and fees.

n Student Resources / Basic Needs

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
 <u>https://psufp.com/</u>
- Free Food Market on the second Monday of the month South Park Blocks, near Shattuck Hall, 9:30-11 a.m.
- South Park Blocks, near Shat
 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
- <u>pdx.edu/writing-center</u>

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: <u>drc@pdx.edu</u>). 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 <u>Title IX please see this website</u> 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.

Tentative Course Outline (subject to change)

<u>Reading details at the bottom</u> and *Italics refer to activities outside of classroom*.

Week	Weekday	Topic(s)	Readings/ Media by	CANVAS Assignments Due (by 10pm)
1	Monday	Intro & mini lecture: logistics and expectations		
	Tuesday		Readings: How to Read Scientific Papers, <u>Tree plantations count toward</u> <u>reforestation goals</u> , & Podcast: Tree planting & climate change.	
	Wednesday	Lecture: Systems thinking, diverse ways of knowing, and forest ecology principles—microclimate.	Pre-lecture short video: Forest Microclimate	
	Sunday		Chen et al 1999. Microclimates in Forests	(Each student) Read, Answer Questions & Submit to the Journal Club Discussions Board.
	Monday	Discussion—Previous Week		In-class Group Discussion questions
2	Tuesdays		Franklin, et al 2018.	Read, Answer Questions & Submit to the Applied Activities Board
	Wednesday	Applied Activity Previous Week	Ecological foundations	
		Lecture: Traits are the building blocks of forest ecosystems	Pre-lecture short read: What is Functional Ecology?	
	Sunday		Rolo et al. 2017.	Read, Answer Questions & Submit to the Journal Club Discussions Board
	Monday	Discussion—Previous Week	Functional Groups	In-class Group Discussion questions
3	Tuesdays		Plant Traits: See <u>US database on plant</u> <u>species ecology and functional traits</u>	Read, Answer Questions & Submit to the Applied Activities Board
	Wednesday	Applied Activity—Previous Week	& Fridley et al., 2023. Legacies of Grime (grads only)	In-class Group Applied questions
		Lecture: Species interactions of the forest	Pre-lecture short video: Species interactions	
	Sunday		Guignabert et al 2020. Stross Cradient Hunothesis (SCH)	Read, Answer & Submit to the Journal Club Discussions Board
			Stress-Gradient hypothesis (SGH)	Forest Synthesis Part I
4	Monday	Discussion—Previous Week		In-class Group Discussion questions
	Tuesdays		Foundation species in the PNW	keaa, Answer & Submit to the Applied Activities Board
	Wednesday	Applied Activity Previous Week		In-class Group Applied questions

		Lastura, Disturbance, farest	Pre-lecture short videos: Forest		
		Lecture: Disturbance, forest	Disturbance.		
		development, and succession	Forest Regeneration & Succession		
	[Friday]		[Friday Fieldtrip to Forest Park]	Read, Answer Questions & Submit to the	
	Sunday		Alough day at al 2021	Journal Club Discussions Board	
	Monday	Discussion—Previous Week	Alexander et al 2021.	In-class Group Discussion questions	
	wonday		laboratore et al. 2009	Road Answer Questions & Submit to the	
	Tuesdays		Dradicting Dostfire Successional	Applied Activities Poord	
			Trajectories		
		Applied Activity Previous Week	nujectories &		
			Poorter et al. 2023		
5	Wednesday		Successional Theories (arads only)	In class Group Applied questions	
5	weathesday		Pre-lecture short video: future of old		
		Lecture: Old-growth forests	growth forests in the PNW: Epiphytes on		
			the Redwoods.		
	Sunday		Spickler et al 2006. New niche for salamanders in the PNW	Read, Answer Questions & Submit to the Journal Club Discussions Board	
	Monday	Discussion—Previous Week		In-class Group Discussion questions	
	Tuesdays		Your own old-arowth research	Read, Answer Questions & Submit to the	
	Tuesdays		&	Applied Activities Board	
	Wednesday	Applied Activity Previous Week	McMullin et al. 2019.	In-class Group Applied questions	
c			Out with the OLD growth (grads only)		
6		Lecture: Early-seral forests	Pre-lecture podcast: Early Seral Forest		
	Sunday			Read, Answer Questions & Submit to the	
			Bruns et al 2020	Journal Club Discussions Board	
			Farly seral forests and postfire funai		
				Forest Synthesis Part II	
7	Monday	Discussion—Reading Previous Week		In-class Group Discussion questions	
	Turnel		Swanson et al. 2011.	Read, Answer Questions & Submit to the	
	Tuesadys		Early seral forests: the forgotten forest	Applied Activities Board	
			succession stage	In class Crown Applied questions	
	Wednesday	Applied Activity Providus Mack	&		
		applied Activity Previous Week	Donato et al. 2012.		
			Born to be complex (grad only)		

		Lecture: Biodiversity and community ecology in forest ecosystems	Pre-lecture short prep work: TBD	
	Sunday		Berry et al 2008.	Read, Answer Questions & Submit to the Journal Club Discussions Board
8	Monday	Discussion—Previous Week	Impacts of logging on tree diversity	In-class Group Discussion questions
	Tuesdays		Your own biodiversity research &	Read, Answer Questions & Submit to the Applied Activities Board
	Wednesday	Applied Activity Previous Week	Dynamic Ecology Post: Thumbs up for the IDH	In-class Group Applied questions
		Lecture: Invasive species in forest ecosystems	Pre-lecture short videos: <u>Invasive</u> species in Oregon; <u>Sudden Oak Death</u>	
	[Eriday]		[Friday Fieldtrip to the Columbia Gorge]	
	Sunday		Reiva et al 2010. Invasional meltdown	Read, Answer Questions & Submit to the Journal Club Discussions Board
	Monday	MEMORIAL DAY—PSU is closed		
	Tuesdays			
9	Wednesday	Discussion—Previous Week		In-class Group Discussion questions
	Sunday			
10	Monday	Lecture: Global change: forests of the past and future	Pre-lecture short prep work: The tree at the bottom of the world	
	Tuesdays		Coop et al 2020.	Read, Answer Questions & Submit to the Applied Activities Board
	Wednesday	Discussion—Previous Week	Wildfire-driven forest conversion	In-class Group Applied questions
		Grad Students Presentations		Forest Synthesis Part III
11	FINALS WEEK (no class this week)			

READINGS & MEDIA

(Remember to access the papers from the library search page)

- Week 1
 - Short readings and media pieces
 - How to read a scientific paper?
 - <u>Guide #1 (Purdue Uni)</u>.
 - Guide #2 (multi-authors—See CANVAS's Week 1).
 - Applied example of a real-world complex problem:
 - Should tree plantations count toward reforestation goals? It's complicated (<u>here</u>).
 - Podcast: Can Tree Planting Help Solve The Climate Crisis with Lauren Oakes (<u>here</u>).
 - Pre-lecture short video: <u>The Ecology of Microclimate</u>.
 - Journal Club--Peer-Review Scientific Paper Reading
 - Chen et al.. 1999. Microclimate in Forest Ecosystem and Landscape Ecology: Variations in local climate can be used to monitor and compare the effects of different management regimes. BioScience 49:288–297. <u>https://doi.org/10.2307/1313612.</u> -- <u>Please practice your library skills and retrieve this paper on your own</u>.
 - Applied Activity
 - Franklin et al. 2018. Functions of forest ecosystems. From, Chapter 2 "Understanding Forest Ecosystems" in Ecological Forest Management. Waveland Press Inc. (See CANVAS week's 1 page).

• Week 2

- Short readings and media pieces
 - Pre-lecture short reading: <u>What is Functional Ecology?</u>
- o Journal Club
 - Rolo et al. 2017. Tree and bird functional groups as indicators of recovery of regenerating subtropical coastal dune forests. *Restoration Ecology* 25, 788–797. <u>doi:</u> <u>10.1111/rec.12501</u>
- Applied Activity
 - Plant Traits: See <u>US database on plant species ecology and functional traits</u>.
 - Grads Only: Fridley et al., 2023. Legacies of Grime.
- Week 3
 - Short readings and media pieces
 - Pre-lecture short video: <u>Species Interactions</u>
 - o Journal Club

- Guignabert et al. 2020. <u>Complex biotic interactions mediated by shrubs: Revisiting the stress-gradient hypothesis and consequences for tree seedling survival. *Journal of Applied Ecology* 57: 1341–1350. doi: 10.1111/1365-2664.13641.
 </u>
- Applied Activity
 - Foundation species in the PNW.

• Week 4

- Short readings and media pieces
 - Pre-lecture short videos: <u>Forest Disturbance.</u> <u>Forest Regeneration & Succession</u>
- Journal Club
 - Alexander et al 2021. Mesophication of oak landscapes: evidence, knowledge gaps, and future research. BioScience 71(5):531–542. <u>https://doi.org/10.1093/biosci/biaa169</u>
- Applied Activity
 - Johnstone et al., 2008. <u>A key for Predicting Postfire Successional Trajectories in Interior</u> <u>AK (pages 1-14)</u>.
 - Grads Only: <u>Poorter et al. 2023. Successional Theories—An Historical Review</u> (focus on the conceptual diagrams).

• Week 5

- \circ $\;$ Short readings and media pieces $\;$
 - Pre-lecture short videos: <u>Old growth forests in the PNW; Epiphytes on the Redwoods.</u>
- o Journal Club
 - Spickler, et al. 2006. Evidence of a new niche for a North American salamander: Aneides vagrans residing in the canopy of old-growth redwood forest. Herpetological Conservation and Biology 1(1): 16-27.
- Applied Activity
 - Your own old-growth research
 - Grads Only: <u>McMullin et al.</u>. 2019. Out with OLD growth, in with ecological continNEWity: new perspectives on forest conservation. Frontiers in Ecology and the Environment 17:176–181.

• Week 6

- Short readings and media pieces
 - Pre-lecture podcast: <u>Early Seral Forest</u>.
- o Journal Club
 - Bruns et al. 2020. <u>A simple pyrocosm for studying soil microbial response to fire reveals</u> <u>a rapid, massive response by *Pyronema* species. PLoS ONE 15(3): e0222691.
 </u>
- Applied Activity

- Swanson et al. 2011. <u>The forgotten stage of forest succession: early-successional</u> ecosystems on forest sites. Frontiers in Ecology and the Environment 9:117–125.
- Grad Only: Donato et al. 2012. <u>Multiple successional pathways and precocity in forest</u> <u>development: can some forests be born complex?</u> Journal of Vegetation Science 23:576–584.

• Week 7

- Short readings and media pieces
 - Pre-lecture short video: TBD
- Journal Club

Berry et al. 2008. Impacts of selective logging on tree diversity across a rainforest landscape: the importance of spatial scale. *Landscape Ecology* 23:915-929.

- Applied Activity
 - Your own biodiversity research
 - Grads Only: <u>Dynamic Ecology Post: Thumbs up for the Intermediate Disturbance</u> <u>Hypothesis (IDH)</u>

• Week 8

- o Short readings and media pieces
 - Pre-lecture short videos: a) <u>Invasive species in Oregon</u> (btw, anything wrong about this message?) b) <u>Sudden Oak Death</u>
- Journal Club
 - Relva et al. 2010. <u>Introduced deer reduce native plant cover and facilitate invasion of</u> <u>non-native tree species: evidence for invasional meltdown</u>. *Biological Invasions* 12:303-<u>311</u>.

• Week 9

- \circ $\;$ Short readings and media pieces $\;$
 - Short reading: The tree at the bottom of the world (see CANVAS week's 9)
- o Journal Club
 - Coop et al. 2020. Wildfire-Driven Forest Conversion in Western North American Landscapes. BioScience 70:659–673.
- Week 10—no new readings. Discussions and Grad student presentations.