

Forest Biology (Biology 307)

--- Fall 2021 ---



Class Meetings -

Lectures: TR 8:30am – 9:50pm

Place: LA 222

Lab: Tues 1:00pm – 3:50pm

Place: Klamath 5

Instructor Info -

Dr. Jeff Diez

Associate Professor, Dept. Biology

jdiez@uoregon.edu

Office hours: t.b.d. and/or email anytime for appointment

Sarah Erskine

Graduate Student, Dept. Biology

serskine@uoregon.edu

Course Materials

Required:

(1) *Manual of Oregon Trees and Shrubs* (Jensen). This is a very nice, conveniently-sized field guide to common trees and shrubs of Oregon.

(2) *Lab Packet*

In addition, we will use *readings* either posted to Canvas and available for download as pdf files or accessible for free over the internet with UO access.

Overview

In this course, we explore forest ecology and management from a biological perspective. We will examine forests across levels of organization, from tree cells and physiology, to populations, to the many diverse interactions among species, up to ecosystem processes. This will involve examining details of organismal biology but also ‘zooming out’ to think about larger-scale forest processes. We will try to understand the dynamic nature of forests – how they change from place to place and over time. Because humans depend on and affect forests, we will reflect on our role in managing forests for the varied resources and biodiversity they contain. Prerequisites include familiarity with basic ecological concepts as well as basic chemistry terms and concepts. We will further expect you are willing and ready to think critically and approach complex topics with an open mind.

Learning Objectives

Students who successfully complete this course will be able to:

- Recognize and name at least twenty local tree species by memory
- Use a dichotomous key to identify other woody shrubs or trees native to Oregon
- Explain why forests are found in certain areas, and why conifers are so prevalent in the PNW
- Explain how forest communities have changed over ecological time in response to climate and project how forests might be altered with future climate change
- Explain how trees’ internal anatomy is related to their physiological ecology
- Describe how nitrogen and carbon cycle within a forest and identify important fluxes and stores
- Explain the roles of seemingly inconsequential organisms including bacteria, fungi, nematodes, and microarthropods.
- Explain the roles of fire, disease, and insects in different forest types
- Explain the goals of genetic breeding programs in silviculture
- Evaluate claims about forest management practices and express opinions using credible scientific evidence
- Be comfortable with uncertainty and complexity in answering questions about forest management
- Remain appreciative of the aesthetic values of forests while simultaneously having a better understanding of the biological processes that shape them.

Course Schedule

Wk	Date	Topic	Readings	Lab / Assignments
1	9/28	1) Introduction to Forest Biology and Forests of the PNW	<ul style="list-style-type: none"> Spies & Duncan; Old Growth in a New World Rapp; Science Update 1, Restoring Complexity 	Lab 1: Use of Tree ID keys
	9/30	2) Forest Biogeography and long term ecosystem change	<ul style="list-style-type: none"> Waring Land of Giant Conifers Hebda & Whitlock Environmental History 	
2	10/5	3) How trees grow, get thick and how water moves	<ul style="list-style-type: none"> Thomas Chapter 3 	Lab 2: Campus Tree Walk dress to be outdoors; bring Manual of Oregon Trees and Shrubs
	10/7	4) Soil Processes and Water	<ul style="list-style-type: none"> Zimmerman, Piping Water to the Treetops Nardi on Soil: pp 1-10; 36-45; 239-251 	
3	10/12	5) Mycorrhizae and Nutrients	<ul style="list-style-type: none"> Nardi: Mycorrhizae and Nutrients pp. 11-22 Smith - mycorrhizae Intro Smith - mycorrhizae Chapter 16 	Lab 3: Alton Baker Tree Walk – dress to be outdoors, bring Manual of Oregon Trees and Shrubs Homework #1 due Oct 12
	10/14	6) Demography & Population Dynamics	<ul style="list-style-type: none"> Thomas Ch 5 – Towards the next generation Thomas Ch 8 – New trees from old 	
4	10/19	7) Forest Genetics	<ul style="list-style-type: none"> Forest Genetics – Chapter 1 Friedman Forest Genetics for Ecosystem Management 	Lab 4: Leaf and Stem Anatomy
	10/21	First Midterm Exam (1-7)		
5	10/26	8) Forest Pests & Diseases	<ul style="list-style-type: none"> Schowalter et al. Integrating Ecological Roles of Insects, Pathogens, and Mycorrhizae Bettlejewski, Nelson, Shaw (use as reference material) Insects: Wickman, Fellin, Amman (use as reference material) 	Lab 5: Wood Anatomy Homework #2 due Oct 26
	10/28	9) Community ecology: patterns & mechanisms of species diversity	<ul style="list-style-type: none"> T.B.D. 	
6	11/2	10) Understory processes and diversity	<ul style="list-style-type: none"> T.B.D. 	Lab 6: Microorganisms
	11/4	11) Nutrient Cycling in Forests and importance of Nitrogen	<ul style="list-style-type: none"> Barron Predatory Fungi Lovett Insect Defoliation and Nitrogen 	
7	11/9	12) Decomposition and Soil Organisms	<ul style="list-style-type: none"> Moldenke: Soil Arthropods Nardi: Organisms; 22-36; Nardi 47-67 (Microbes); Nardi Composting 251-256 	Lab 7: Soil Fauna
	11/11	Veteren's Day – no class		
8	11/16	13) Biomass, Productivity & Carbon Cycling	OPTIONAL: <ul style="list-style-type: none"> Lehmann and Kleber Contentious Soil Carbon Ryan et al Forests and Carbon for US Forests 	Optional - open lab review for lab exam and midterm Homework Set #3 due 5/21
	11/18	Second Midterm Exam (8-13)		
9	11/23	14) Succession and Fire Ecology	<ul style="list-style-type: none"> Franklin Conserving OG Forests and Attributes Noss et al Managing Fire Prone Forests Kaufman: Perceptions of Fire, Land Use, Restoration 	Lab Exam in lab, Nov 23
	11/25	Thanksgiving – no class		
10	11/30	15) Landscape Ecology & Management	<ul style="list-style-type: none"> Rapp; SU 3, Dynamic Landscape Management Cissel Landscape Management using fire regimes Cornwall Against the Grain (Jerry Franklin) 	
	12/2	16) Synthesis	<ul style="list-style-type: none"> Spies et al. Conserving Old Growth in a New World Moore Spiritual Value of Old Growth Forests 	
11	12/7	Final Exam (Cumulative) 8:00 Tuesday, December 7. in classroom (?)		

Red = exam or assignment; Green = outdoor activity

Assignments & Grading

If you earn 70% or more of the total possible points, you are guaranteed a C; earn 80% and you receive at least a B-; earn 90% and receive at least an A-. I may lower these cutoffs, but I will not raise them. What does this mean for you? If you do satisfactory work (in my judgment), you earn a C, good work earns a B, and excellent work earns an A. I grade on performance, not on effort, but it is extremely rare that anyone who comes to class regularly, does the reading, and puts a serious effort into studying doesn't pass with a C or better.

Grade Criteria

<u>Component</u>	<u>Percent of total</u>
midterm exams (two @ 16% each)	32%
final exam	20%
lab exam	20%
homework	18%
lab participation	10%
Total	100%

Lab Activities

Labs are an important part of the course. It is not often possible to make-up a lab because they typically require special materials. If you know in advance that you have to miss a lab, contact me to see if you can make other arrangements. You will not turn in formal lab reports for this class, but some notes that you take in lab may be used on a portion of the lab exam. On the lab days when we are scheduled for a walk, please dress for field conditions: it is usually a good idea to bring several layers of clothes in case it is cold or warm. If it has rained in the past day or so be prepared for damp vegetation; rain coats, rain pants, and rubber boots are a good idea if it is really wet. Bring water and any food you might want.

Homework and late policies

There are three homework assignments. They are meant to help you study so as to do well on the exams. Do them as you go along, not all at the last minute. Each is worth 6% of your course grade. Late assignments will have ten percent deducted per day late. Homework may not be accepted after the exam, however (as it defeats the purpose).

Exams

Often you will be asked to apply or to synthesize information. This is harder than simply recalling facts. I don't give make-up exams, so note the dates of the exams and don't make plans to be gone on any of those dates. The final exam will be cumulative.

Ideas for how to do well in this course

- Attend all class functions (lectures, labs), arrive on time, and participate actively
- Do the assigned reading. You don't have to read it thoroughly in advance, but skim the material so that you know what is there and can go back and read in more depth later.
- Use slides posted to Canvas for studying, but do not use these as a replacement for attending lectures.
- Ask questions.
- Get together with someone else in the class at least once a week to study. Without looking at notes, reconstruct the most important concepts studied in class that week. Then use your notes to fill in the gaps in your understanding.

- Ask yourself how what you are learning matters. If it isn't apparent, then ask. Pay attention to issues in the news that are relevant concepts covered in this course.
- Don't believe everything you hear or read; back up your own opinions with credible evidence and logic.
- Don't miss the forest for the trees; the big picture is essential.

Course Policies

COVID Prevention & Containment

Prevention:

- Wear your **mask** and make sure it fits you well
- **Stay home** if you're sick
- **Get to know your neighbors** in class, and let them know if you test positive
- **Get tested** regularly
- Watch for **signs and symptoms** with the daily symptom self-check
- **Wash your hands** frequently or use hand sanitizer

Containment: If a student in class tests positive for COVID-19, everyone should:

- Expect and follow guidance in classroom notification
- Answer the call if contacted by the Corona Corps (541-356-2292)
- Isolate if you test positive or are symptomatic
- Quarantine if you are a close contact
- Test weekly if you are unvaccinated or partially vaccinated
- Stay home if symptomatic and complete the UO [COVID-19 case and contact reporting form](#) if you test positive or are a close contact of someone who tests positive.

Support: The following resources are available to students.

- [University Health Services](#) or call (541) 346-2770
- [University Counseling Center](#) or call (541) 346-3277 or (541) 346-3227 (after hrs.)
- [MAP Covid-19 Testing](#)
- [Corona Corps](#) or call (541) 346-2292
- [Academic Advising](#) or call (541) 346-3211
- [Dean of Students](#) or call (541)-346-3216

Communications

Office Hours:

I will host office hours in whatever way I can this quarter, depending on COVID circumstances, to be determined in the first week of classes. I will also establish a running discussion forum on our Canvas called "Class Questions and Answers" for the entire group to ask and answer questions as they come up. I welcome meetings outside my regular office hours, too, knowing that there is considerable uncertainty in all of our lives right now. Just email me to set a time. If you contact me with a question, I will try to respond within one business day. I typically provide feedback on assignments within one week.

Why should you reach out to me?

I enjoy talking with students about the course materials and related topics, so please contact me if you're confused or just excited about discussing something. I'm also happy to talk about how (or whether) what we're learning relates to current events, career choices, or other classes you can take UO. Beyond these course-related topics, please get in touch with me if you are having a hard time with the class or other aspects of your academic career. I understand these are difficult times for many of us, in many different ways, so I would be happy to listen and/or strategize with you to find solutions. I will do everything I can to help you succeed. If there are deeper challenges that would benefit from professional help, please see below ("*Your well-being*") for some ideas regarding available support on campus.

Academic Integrity & Classroom Conduct

I expect everyone to follow University rules and guidelines for behavior. Academic dishonesty, which includes cheating and plagiarism, is a serious offense and will be treated according to the guidelines in the student conduct code (located at conduct.uoregon.edu). This doesn't mean you shouldn't talk with other students about what you are thinking or writing; it does mean that when you write something, it should be in your own words, not copied from someone else.

My guiding principle for conduct within this course is **mutual respect**. Our classroom should be a place where each of us is treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability - and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. Classroom courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name, but I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the quarter (or before) so that I may address you properly.

Accessibility

I encourage students with disabilities, including "invisible" disabilities like chronic diseases, learning disabilities, and psychiatric disabilities to discuss with me as soon as possible what appropriate accommodations might be helpful. You are also encouraged to contact the Accessible Education Center in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu.

Your well-being

This continues to be a hard time for people in many different ways. The pandemic can exacerbate existing challenges associated with college life and life in general. If any aspects of your life are not going well, there are UO resources that could help. I would encourage you to pursue the following resources if they would be helpful or get in touch with me directly if it would help to discuss any extenuating circumstances. Getting help is a courageous thing to do—for yourself and those you care about.

[University Health Services](#) help 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 identity-based 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).

Basic Needs. Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live and believes this may affect their performance in the course is urged to contact the Dean of Students Office (346-3216, 164 Oregon Hall) for support. The [UO Basic Needs Resource Guide](#) includes resources for food, housing, healthcare, childcare, transportation, technology, finances, and legal support.

Assigned reading

- Spies, Thomas, and Sally Duncan. 2009. **Searching for Old Growth**. Chapters 1-3 in *Old Growth in a New World*. Island Press.
- Rapp, Valerie. 2002. **Restoring Complexity: Second-Growth Forests and Habitat Diversity**. Science Update Issue 1, Pacific Northwest Research Station. <http://www.fs.fed.us/pnw/publications/sci-update.shtml>
- Waring, Richard H. 1983. **Land of the Giant Conifers**. Natural History. October, pp. 55-62.
- Hebda, Richard, J., and Cathy Whitlock. 1997. **Environmental History**, Chp. 9 in *The Rainforests of Home; Profile of a North American Bioregion*. edited by P.K. Schoonmaker et al. Island Press.
- Zimmerman, Martin H. 1982. **Piping Water to the Treetops**. Natural History, July pp.6-13.
- McCullough, Patrick. 1998. **Mycorrhizae, your silent partner**. Western Arborist 24(4) <http://www.wcisa.net/magDetails.asp?MagazineID=8&Detail=1>
- Zimmer, Carl. 2001. **The web below**. Western Arborist 26(4). <http://www.wcisa.net/magDetails.asp?MagazineID=15&Detail=1>
- Perry, Dave, Ram Oren, and Stephen Hart. 2008 **Forest Ecosystems** 2nd edition. Johns Hopkins. (previously used textbook) selection on Cedar Camp, pages 453-456.
- Barron, G.L. 2003. **Predatory fungi, wood decay, and the carbon cycle**. Biodiversity, Volume 4:3-9. <http://www.uoguelph.ca/~gbarron/MISC2003/feb03.htm>
- Lovett, Gary M. et al. 2002. **Insect Defoliation and Nitrogen Cycling in Forests**. BioScience 52(4): 335-341.
- Moldenke, Andy. 2002. **The Soil Biology Primer**. chp 7. **Arthropods**. http://soils.usda.gov/sqi/concepts/soil_biology/arthropods.html
- Lehmann, Johannes and Markus Kleber. 2015. **The contentious nature of soil organic matter**. Nature 258 : 60-68.
- Ryan, M.G et al. 2010. **A Synthesis of the Science on Forests and Carbon for US Forests**. Issues in Ecology, report # 13. . http://esa.org/science_resources/issues.php
- Franklin, Jerry 2009. **Conserving Old Growth Forest and Attributes**. Chp. 22 in *Old Growth in a New World*.
- Noss, Reed, et al. 2006. **Managing fire-prone forests in the western United States**. Frontiers in Ecology and Environment 4(9):481-487.
- Schowalter et al. 1997. **Integrating the Ecological Roles of Phytophagous Insects, Plant Pathogens, and Mycorrhizae in Managed Forests**. Chp. 11 in *Creating a Forestry for the 21st Century*. edited by Kathryn A. Kohm and Jerry Franklin. Island Press.
- Use the following 6 as references to help with lecture material. Don't sweat the details that aren't stressed in lecture.
- Betlejewski, Goheen, Angwin, Sniezko. 2011 **Port Orford Cedar Root Disease**. USDA Forest Service. R6 FIDL 131. Available at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5346825.pdf
- Nelson, Earl, N. Martin, and R. Williams. 1989. **Laminated root rot of western conifers**. FIDL #159. <http://www.fs.fed.us/r6/nr/fid/fidls/fidl159.htm>
- Shaw, David, 2008. Swiss needle cast of Douglas-fir in Oregon. Oregon State Extension Forest Health Fact Sheet. <http://www.oregon.gov/ODF/privateforests/docs/fh/SwissNeedleCast.pdf?ga=t>
- Wickman, Boyd; Richard R. Mason and Galen C. Trostlel. Not dated. **Douglas-Fir Tussock Moth** U.S. Department of Agriculture Forest Service Forest Insect & Disease Leaflet 86. <http://www.fs.fed.us/r6/w-w/resources/dftm.htm>
- Fellin, David, and J. Dewey. 1982. **Western Spruce Budworm**. U.S. Department of Agriculture Forest Service. Forest Insect & Disease Leaflet 53 <http://www.na.fs.fed.us/spfo/pubs/fidls/westbw/fidl-wbw.htm>
- Amman, Gene, M. McGregor, and R. Dolph, Jr. 1989. **Mountain Pine Beetle**. U.S. Department of Agriculture Forest Service. Forest Insect & Disease Leaflet 2. <http://www.barkbeetles.org/mountain/fidl2.htm>
- Friedman, Sharon. 1997. **Forest Genetics for Ecosystem Management**. Chp 13 in *Creating a Forestry for the 21st Century*. edited by Kathryn A. Kohm and Jerry Franklin. Island Press.
- Rapp, Valerie. 2003. **Dynamic Landscape Management**. Science Update Issue 3, Pacific Northwest Research Station. <http://www.fs.fed.us/pnw/publications/sci-update.shtml>
- Cissel, J. H., F.J. Swanson, and P.J. Weisberg. 1999. **Landscape Management Using Historical Fire Regimes: Blue River, Oregon**. Ecological Applications 9(4): 1217-1231.
- Cornwall, W. 2017. **Against the Grain**. Science 358(6359), 24-27.
- Spies, Thomas, et al. 2009. **Conserving OG in a New World**. Chp. 27 in *Old Growth in a New World*. Island Press.
- Moore, Kathleen Dean. 2007. **In the Shadow of the Cedars: the Spiritual Values of Old-Growth Forests** Conservation Biology 21(4): 1120-1123
- And assigned pages in Nardi, James. 2007 **Life in the Soil**. University of Chicago Press.
- Several readings are chapters from **Old Growth in a New World, A Pacific Northwest Icon Reexamined**. 2009. Island Press

ebooks available online via UO library

Author: Nardi; title: Life in the Soil : A Guide for Naturalists and Gardeners

Author: Thomas; title: Trees: their natural history

Author: Bailey; title: Silviculture and Ecology of Western U.S. Forests