

**Environmental Systems 2** ESM 321/324 | Winter 2020  
T/Th 10-11:50am | Labs: T/Th/F 12:30-4:20pm | SRTC  
101/149

**Instructor:** Jae Pasari, Ph.D., pasari@pdx.edu, OH: W 1-2pm in SRTC  
206

**TA (T):** Vanessa Robertson-Rojas, vrobe@pdx.edu, OH: W 1:30-2:30 in SRTC  
B1-26 **TA (Th):** Olamide Alo, olamide@pdx.edu, OH: F 1-2pm in SRTC B1-13 **TA**  
(F): Alana Simmons, simmons8@pdx.edu

**Text:** Fundamentals of Ecosystem Science (2013). (e-book in library course reserves under  
Pasari)

**Notebook:** Waterproof 8.5" x 11" *Rite in the Rain* 373-MX (Also permissible: 351/361/371FX or  
353N)

Purchase at SRTC 280, Powell's, REI, or online immediately. Required for lab during  
week 2.

**Website:** [www.environmentalsystems2.com](http://www.environmentalsystems2.com)

**Course overview and objectives** This course focuses on ecosystem science, which is the study of how energy and materials move through organisms (microbes, plants, animals) and the non-living environment (soils, atmosphere, water). Cycles of energy and matter are fundamental to all life on Earth, and they provide ecosystem services that human societies rely on. Understanding how terrestrial and aquatic ecosystems work is essential to managing natural resources and to addressing environmental problems from local to global scales.

Part 1 will introduce ecosystem science and energetics (primary production, secondary production, and decomposition), while Part 2 will focus on biogeochemistry (cycles of the major elements: C, N, and P) and the factors that control ecosystem processes. The last two weeks will serve to integrate concepts through case studies and examples. Students will gain an understanding of: (1) the ecosystem approach to environmental science; (2) important interactions between living and nonliving components of terrestrial and aquatic systems; (3) how human activities impact ecosystems

**Grades** Lecture: Homework 33% Midterm Exam 33% Final Exam 33% *Both exams are cumulative, closed-book, and open-note. Calculators are allowed. Computers are not.*

Lab: Field/lab book 25% (lowest score dropped)

Lab 2 Peer Review 10%

Lab 2 Report 25% Lab 3

Peer Review 10% Lab 3

Report 30%

A = 100-94% | A- = 93-90% | B+ = 89-87% | B = 86-84% | B- = 83-80% | C+ = 79-77% | C = 76-74% | C- = 73-70% | D = 69-60% | F = 59% or less

**Late work:** Unexcused late work will be penalized 10% per day. If you are ill please stay home. Contact the instructor and TA prior to class or as soon as possible (by email). Assignments later than one week past the due date will not be accepted. Assignments must be turned in to D2L or (as specified by your TA) by 16:00 to receive a same day time stamp.

**Lab reports:** We will have one peer review session for Lab 2 and one peer review session for Lab 3; instructions on how to prepare and how to review a draft will be given verbally in class. Reports are turned in to your TA as hard copies or through D2L as specified by your TA and are due at the beginning of the lab the day they are due. Lab 2 reports are due in lab during week 5 and week 7 on your scheduled lab day. Lab 3 reports are due in the D2L drop box or the physical drop box (as specified by your TA; SRTC 218) on Friday March 20 at 4pm; no late papers will be accepted and no extensions will be granted.

**Lab Prep:** For field labs, bring appropriate outdoor gear, including day pack, water, field/lab book, hiking shoes/boots and raingear including impermeable gloves, hat, coat and pants. Note that we will go to the field as long as the university is open, regardless of rain or cold weather. We will walk several miles in occasionally steep terrain. You will be using the department's equipment and are responsible for using it correctly, and returning equipment in working order after every lab. If you lose or break an item you will be charged for its replacement value. Arrive to lab on time - we will not wait for latecomers and you will not receive credit.

**Participation:** Attendance and active participation is required. Students comfortable with the material are expected to provide guidance to those students who need assistance. Students start and finish the lab together; points will be deducted for leaving the lab early without permission. Missing a lab will only be excused with *prior* permission and at the discretion of the instructors.

**Literature Research:** It is very tempting to think that all necessary resources or information will be available in full text after typing in a few words at Google.com. This is not the case. You will often need to go to the library, use real library search tools and access real books and articles contained in refereed/archival journals. Be sure to make use of the Vikat library catalog. Go to the PSU library home page at [library.pdx.edu/](http://library.pdx.edu/).

**Desire2Learn:** The class webpage ([www.environmentalsystems2.com](http://www.environmentalsystems2.com)) is the main online resource for ESM 321, but D2L will be used to record grades and for the submission of select assignments. D2L will be used more for ESM 324.

**Personal electronic devices:** Laptops or personal electronic devices may not be used during class except for quiet note taking, doing requested informational research, or as needed during group projects.

**Student Conduct:** All work should be written in your own words and cited appropriately. Do not quote large

sections of text written by others. Plagiarized work will receive a zero. See <http://www.pdx.edu/dos/codeofconduct>

- Tips:**
1. Don't be afraid (of my face).
  2. Put in the time (~8 hours/week).

**Access and Inclusion for Students with Disabilities** If any aspects of instruction or course design result in barriers to your inclusion or learning, please notify me. The Disability Resource Center (DRC) provides reasonable accommodations for students who encounter barriers in the learning environment. If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations. The DRC is located in 116 Smith Memorial Student Union, 503-725-4150, [drc@pdx.edu](mailto:drc@pdx.edu), <https://www.pdx.edu/drc>. If you already have accommodations, please contact me to make sure that I have received a faculty notification letter and discuss your accommodations. Students who need accommodations for tests and quizzes are expected to schedule their tests to overlap with the time the class is taking the test. Please be aware that the accessible tables or chairs in the room should remain available for students who find that standard classroom seating is not useable. For information about emergency preparedness, please go to the Fire and Life Safety webpage (<https://www.pdx.edu/environmental-health-safety/fire-and-life-safety>) for information.

**Title IX Reporting** You may report any incident of discrimination or discriminatory harassment, including sexual harassment, to either the Office of Equity and Compliance or the Office of the Dean of Student Life. Please be aware that as a faculty member, I have the responsibility to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination. If you would rather share information about sexual harassment or sexual violence to a confidential employee who does not have this reporting responsibility, including an Interpersonal Violence Advocate at the Women's Resource Center or the Queer Resource Center, you may contact a confidential advocate by calling 503-725-5672. This Sexual Misconduct Website provides a complete list of those confidential employees and off campus resources: <https://www.pdx.edu/sexual-assault/get-help>

**Safe Campus Online Training Module:** PSU *requires* all students to take the learning module entitled "Creating a Safe Campus: Preventing Gender Discrimination, Sexual Harassment, Sexual Misconduct and Sexual Assault." If you or someone you know has been harassed or assaulted, you can find resources at <http://www.pdx.edu/sexual-assault>. For questions about the module contact [saveact@pdx.edu](mailto:saveact@pdx.edu). Do not contact your instructor.

**Tentative Schedule** (actual schedule and all homework links are updated at [www.environmentalsystems2.com](http://www.environmentalsystems2.com))

**Week Date In Class**

1 T 1/7 Syllabus, Survey, Ecosystem Principles 1 Th 1/9 Measurements & Sampling 1 *Lab Excel Tutorial* 2 T 1/14 Statistics Review 2 Th 1/16 Terrestrial Primary Production 2 **Lab Field Trip: Lab Overview, Tree ID, Foliage & Litter Sampling** 3 T 1/21 Aquatic Primary Production 3 Th 1/23 Secondary Production 3 **Lab Field Trip: Soil Sampling** 4 T 1/28 Decomposition 4 Th 1/30 Review, HW 1 4 *Lab Sample Preparation (Soil Respiration Lab)* 5 T 2/4 **Midterm** 5 Th 2/6 Elements & Soil 5 *Lab Sample & Data Analysis (Soil Respiration Lab)* 6 T 2/11 Carbon Cycle 6 Th 2/13 Nitrogen Cycle 6 *Lab Sample Preparation (Phosphorous Lab)* 7 T 2/18 Phosphorous Cycle 7 Th 2/20 Synthesis 7 *Lab Sample Analysis (Phosphorous Lab)* 8 T 2/25 Heterogeneity 8 Th 2/27 Ecosystem Processes 8 *Lab Sample Analysis (Phosphorous Lab)* 9 T 3/3 Review, Case Studies Intro, HW 2 9 Th 3/5 Case Studies 9 *Lab Data Analysis (Phosphorous/Lab 3)* 10 T 3/10 Case Studies 10 Th 3/12 Review 10 *Lab Phosphorous Lab Peer Review* 11 T 3/17 **Final Exam 10:15am** 11 *Lab F 3/20 Phosphorus Lab Reports Due* (no class)

### General Lab Rules

- Goggles are required in *working areas* of the laboratory at all times. Other people's work, as well as your own, can accidentally splatter and blind you. Please do not wear contact lenses, as the capillary action will hold chemicals against the eye and cause serious difficulty in washing your eyes. Goggles may be removed in designated '*non-working*' areas of the lab – do not bring chemicals into these areas.
- If you get a chemical in your eye, you must wash it IMMEDIATELY. Familiarize yourself with the eye wash station and know how to use it before you need it - you may only have a few seconds before you are permanently blinded.
- In the event that a large amount of strong acid or base is spilled on you, get to a shower within 15 seconds. Where is the safety shower?
- There are fire extinguishers in the lab. Put out small fires with a towel, a book, or anything that will not easily catch fire.
- Shoes must completely cover the foot. You will not be allowed to work in the lab if you wear sandals or flip-flops even if you are wearing socks.
- Clothing must reach from the shoulders to the feet. No shorts or halter-tops.
- Any questions about lab safety should be directed to your instructor.

**Before you can work in the laboratory, you must read and understand the rules below:** 1. Do not work in the laboratory unless your instructor is present to supervise your work. 2. Do not carry out any unauthorized experiments. 3. Do not work in a manner that is unsafe to you or those around you. 4. Wear appropriate eye protection AT ALL TIMES in the working areas of the lab. 5. Contact lenses may not be worn in the lab. 6. Do not work with any chemical above or near your face. 7. Do not taste, smell, or ingest any chemical in the laboratory. For the same reason, you **cannot bring food or drink**

**into the laboratory** (no chewing gum, tobacco, candy, coffee, etc.) 8. If you are directed to perform an odor test on a sample, move your hand to waft the vapor to your nose. 9. Never pipet by mouth. 10. Never pipet directly from a reagent bottle. 11. Avoid skin contact with chemicals – Wear gloves. 12. Do not wear gloves outside of the laboratory. 13. Fume hoods must be used when toxic or corrosive vapors are released during the work you are performing. 14. Do not add water to a concentrated reagent, especially sulfuric acid and sodium hydroxide. Add the reagent to water. 15. All broken laboratory glassware must be placed in a special glass disposal box. 16. Bare feet, sandals, shorts, short skirts and short shirts are unsafe and must not be worn in the lab. For fire safety, loose

clothes and ties should not be worn and long hair should be tied back. 17. Only neutral aqueous solutions can go down the drain. Waste determinations and disposal are performed by the instructor and staff – check with them before disposing of any chemical. 18. Wash your hands and wipe down your work bench with a wet sponge after completing your experiments. 19. Do not take any chemical out of the laboratory for any reason. It is illegal and you may be liable if another person is injured by anything you remove from the laboratory.

#### **In case of an accident:**

- If a chemical splashes into your eye, GET HELP IMMEDIATELY. Shout out 'I have a chemical in my eye!'
- If someone near you gets a chemical in his/her eye YOU should: Shout for help from the instructor and provide help if the instructor is not immediately there.
- Wash eyes thoroughly with a stream of water from the wash fountain or closest sink if necessary. Hold the affected eyelid open.
- If any chemical comes in contact with you skin it should be washed off with a stream of water right away.
- Know the exit route from your lab in case of a large solvent spill, fire, or other emergency.
- Immediately report ANY accident to your instructor, no matter how minor it may seem.
- You are advised to have private health insurance. In the case of minor cuts or burns an instructor or staff member may escort you to the Student Health and Counseling Center. In serious cases 911 will be called.