

# GEOL 1641-1010: ECOSYSTEM ECOLOGY

## Fall 2025



**Instructor:** Dr. Anusha Balangoda (she/her); ANB287@pitt.edu

**Lecture Meeting Times:** Tuesday and Thursday 11:00 AM – 12:15 PM

**Lecture Classroom:** 203 Thaw

**Office Hours:** Monday through Thursday 9:00 AM -10:00 AM

**Lab Meeting Times:**

<u>Day</u>	<u>Location</u>	<u>Time</u>	<u>Section Number</u>
Tuesday	Thaw 207	3:00-5:50 PM	1641-1020
Friday	Thaw 207	1:00-3:50 PM	1641-1025

**Required Textbooks:**

- *Elements of Ecology (9th edition), Smith, T.M, and R.L. Smith, 2015. Pearson. ISBN-13: 978-0-321 93418*, as a hard copy at the University bookstore. It can also be purchased online via multiple book vendors, such as used, new, or e-book.

Additional course materials for this course are available through Canvas or the University of Pittsburgh Library. You will find links on Canvas. Two free textbooks are available electronically, such as e-books or online downloads.

- *Principles of Terrestrial Ecosystem Ecology (2<sup>nd</sup> edition), F Stuart Chapin, Pamela A. Matson, Peter Vitousek, & M.C. Chapin.* You can download the full PDF of this book for free.
- *Fundamentals of Ecosystem Science. Weathers KC, Strayer DL, and Likens GE. 2013.* Academic Press, Elsevier. New York, NY. ISBN 978-0-12-088774-3. This e-book is on the Elsevier Science Direct platform. Pitt users can download all chapters using the link at the upper right (download PDFs to a zip file) and save them as permanent PDFs.  
[https://www.sciencedirect.com/book/9780120887743/fundamentals-of-ecosystem-science.](https://www.sciencedirect.com/book/9780120887743/fundamentals-of-ecosystem-science)
- *Terrestrial Ecosystem Ecology: Principles and Applications. Agren GI and Anderson FO. 2012.* Cambridge University Press. ISBN 978-1-107-64825-8. New York, NY. This book is available to Pitt library users through ProQuest eBook Central. Pitt users can navigate to and

select the section they want to read online or download a limited number of pages.

<https://web-p-ebshost-com.pitt.idm.oclc.org/ehost/ebookviewer/ebook?sid=5b2fd36e-28ac-4f7a-9a6f-8ebd086ff1cb%40redis&vid=0&format=EB>

### **Library textbook reserve**

I have reserved the Smith & Smith textbook via course reserve. Please follow the steps below to access it.

### **Finding Course Reserve Materials**

- Go to <http://library.pitt.edu>
- Select the “Course Reserves” link located in the center of the page
- In the PittCat Course Reserve search box, enter the name of the professor (Anusha Balangoda), the course name (GEOL 1641 Ecosystem Ecology), or the course number
- Click on the title of the item that you wish to access
  - For e-books, click on the link under “Full-text availability.”

### **Course Description and Objectives:**

This course will provide students with an introduction to the principles of ecosystem ecology and associated applications to environmental change. Broad course themes include an introduction to ecosystem science, ecosystem function, ecosystem structure, and ecosystem dynamics, including human-driven changes. This course will be delivered primarily as an in-person course, supplemented by some online content. As part of this course, we will conduct interactive activities and discussions; thus, your participation in class is important. Unit quizzes will be administered every 2-3 weeks. In the case of an emergency or illness, lecture materials will be posted online for you to view.

*After completing the course, you should be able to:*

- Articulate the basic principles that govern structure and function across all ecosystems.
- Illustrate how abiotic factors (i.e., physical and chemical environments) influence biotic distributions.
- Construct major elemental cycles, explain how they impact ecosystem structure and function, and compare how humans have altered elemental cycles.
- Describe how ecosystems link atmospheric, hydrologic, soil, and human systems.
- Explain how ecosystem scientists learn, model, and predict changes in ecosystems.
- Summarize present-day environmental challenges and their effects on ecological systems.

### **Lab Description and Objectives:**

Labs will be a mixture of indoor and outdoor activities. Coming prepared to the lab (including weather-appropriate clothing and footwear) is an essential part of participation. Attendance is required for labs. Contact your instructors if you miss a lab due to illness or emergency.

*In the laboratory component of the course, students will:*

- Perform various common ecological field sampling methods
- Gain experience in hypothesis testing and experimental design
- Make inferences about ecosystem structure, function, and/or condition from observed data
- Improve their scientific writing skills through examples, practice, and feedback

### **Commitment to Student Success:**

We are committed to supporting every student's physical and mental well-being! We acknowledge that you may encounter obstacles to your learning during the semester, which can make it more challenging to succeed. We encourage students who are experiencing challenges to reach out to us, a trusted friend, a family member, and/or campus resources for help as soon as possible. I have posted links on Canvas to some resources at Pitt or in Pittsburgh that you may find beneficial, and I encourage students to let me know of any other resources.

### **Be Curious, Be Respectful, Ask Questions**

In this class, every person is responsible for creating a space that is intellectually rigorous and is a welcoming and inclusive environment where we are committed to learning from others, sharing equally in tasks, and respecting other perspectives. The diversity of perspectives and experiences each student brings to this class is viewed as a benefit and adds strength to the overall collaborative learning environment of the course. I expect you to treat fellow classmates with patience and respect. No harsh statements or demeaning or discriminatory behavior will be permitted. Participating in discussions, voicing your opinion, and having fun are encouraged. I highly encourage everyone to participate in class discussions, as those are integral to learning and help you get to know your peers. I create and promote an inclusive classroom that can benefit everyone by sharing your ideas and insights with your peers.

### **Contacting the Instructors:**

Please ask questions if you have them! We can't help you if we don't know you have questions. We encourage you to ask questions in or after the lecture in person. You can also contact us using your email or meet with us outside of class. Please expect a response from us within one business day. You will generally get a faster response if you copy us on the **same email** (i.e., email Dr. Balangoda AND the lab instructor together). We'll post answers to student questions related to class material or assignments as Canvas announcements.

### **Student Hours:**

As teachers, we enjoy interacting with students one-on-one and in the classroom. There are several reasons why you might want to meet with us. For example, you may wish to discuss a class topic in more detail than covered by the scope of the class or ask questions about material outside of class time. If you plan to apply for jobs, internships, or research experiences in the coming semesters, meeting one-on-one with faculty is also a great way to develop potential references. If you would like to meet Dr. Balangoda for capstone internships, graduate school, or career-related questions, please schedule an appointment via Pathways. Alternatively, you could email me with your availability (preferably using a When2meet poll) to schedule an appointment.

### Tips for Success in Class:

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep, and taking time to relax. ***Using your time to take care of yourself will help you achieve your academic goals more than spending too much time studying.***

- Make time at least *every other day* for course material and assignments outside of class.
- Check your Canvas notifications settings, ensuring that you receive course and assignment announcements on a device or email that you check often.
- Read assignment directions early, so you can ask questions prior to deadlines.
- Be prepared to **apply your knowledge**; this requires both memorization (you need the right terms and facts to explain a concept) and **understanding and synthesis** (you need to review and compare material in different ways).
- Take notes as you read the textbook and watch lectures/videos. Research shows that handwritten notes improve learning.
- Turn in assignments on time (each assignment has a due date, and late assignments will be accepted until one week after the due date without documented extenuating circumstances).
- Use each other as a resource for your learning: Clearly explaining a concept or a solution to someone else improves your understanding. We encourage group work on assignments and study groups to prepare for quizzes.
- I highly encourage you to fine-tune your lecture notes with your classmates to ensure that you have detailed lecture notes that can help you for quizzes.
- ***Study smarter, not harder.*** Reflect on the quality of studying you are doing rather than the time you spend studying. Quizzing yourself or your classmates helps you retain knowledge much more than re-reading notes. Spend time studying topics you don't remember, or you need to reinforce, not the ones you know already.

### Graded Work in GEOL 1641:

Your grade will be assessed from several groups of assignments designed to measure student achievement of course and topic objectives. These include Top Hat questions, unit quizzes (in class, on paper, every 2-3 weeks), group presentation, current events in ecology reflection, Perusall readings, laboratory assignments, laboratory reports, and a laboratory presentation. For current events in ecology reflection, you are required to select a recent (within the past year) news article, scientific press release, or reputable media report that discusses a topic in ecosystem ecology. More details and the rubrics are on Canvas. For the group presentation, I have a sign-up sheet on Canvas for you to sign up for one spot based on your preferred date and the journal article. More information and instructions on group presentation are on Canvas. Additionally, Perusall will be used as a platform to read articles, and we will discuss those articles during class time. Everyone is required to read and annotate Perusall reading assignments. Rubrics and instructions for Perusall readings are on Canvas. See Assignments in the course navigation menu on Canvas for detailed instructions and due dates. Top Hat will be used as an engagement tool during lecture time to assess your understanding and provide you with real-time feedback. Points will be offered for participation and correctness. No makeup allowed for Top Hat questions. There will be no

individual or whole class curve. Your final grade will be calculated from your scores according to the weighting described below.

Assignment Type	Objective	Number of assignments
Current Events in Ecology Reflection	Connect class content to real-world issues.	3
Group Presentation	Practice working as a team towards a common goal and improve your communication skills.	1
Unit Quizzes, in-class on Paper	Assess understanding of learning objectives.	5
Perusall Reading Assignments	Improve students' accountability for engaging with content outside the classroom.	7
Laboratory Assignments	Gain experience in hypothesis testing and experimental design.	7
Laboratory Reports	Make inferences about ecosystem structure, function, and condition from observed data.	2
Laboratory Presentation	Practice communicating concepts and science.	1

Your Semester Grade is Determined by:

Top Hat (for participation)	3%
Ecology reflection	8%
Group presentation	5%
Unit quizzes	35%
Perusall readings	5%
Laboratory assignments	20%
Laboratory reports	20%
<u>Laboratory presentation</u>	<u>4%</u>
Semester Total	100%

Course grades will be assigned based on the following scale:

A	100 - 89.5 %
B	< 89.5 - 79.5%
C	< 79.5 - 69.5 %
D	< 69.5 – 59.5 %
F	< 59.5 – 0%

**Laboratory assignments** based on weekly labs will entail making figures and answering questions regarding that week's lab activities and will be submitted via Canvas (**no email**) one week after the lab. These assignments will be graded holistically based on the level of thought put into explanations

using the rubric on Canvas. Students are encouraged to keep a lab notebook, as detailed note-taking will make completing the lab reports and assignments easier.

**Laboratory reports** are required for two labs (Aquatic Invertebrates and Decomposition) and will be submitted electronically via Canvas. Instructions for Formal Lab reports and a rubric are on Canvas.

**Course Schedule:** *(Please be flexible, as our situation may change slightly. For the most current information, please refer to the course schedule online, which may be updated during the semester.)*

Date	Topic	Unit	Lab	Location
Aug 26	Introductions, LMS & Communications	1	Introduction and Annotated Bibliography	Indoor
Aug 28	Intro to Ecology and Ecosystems	1		
Sep 2	History of Concepts in Ecology	1	Field Visit and Leaf Collection	Outdoor
Sep 4	Climate, Water, and Energy (Part 1)	1		
Sep 9	Climate, Water, and Energy (Part 2)	1	Decomposition Lab Part 1	Indoor
Sep 11	<b>Quiz 1</b> Primary production part 1	2		
Sep 16	Terrestrial Communities	2	Aquatic Invertebrates Part 1 & Decomposition Lab Part 2	Outdoor
Sep 18	Community Structure	2		
Sep 23	Aquatic Communities	2	Photosynthesis Lab	Indoor
Sep 25	Primary production part 2	2		
Sep 30	<b>Quiz 2</b> Soils, part 1	3	Soils Lab	Outdoor
Oct 2	Soils, part 2	3		
Oct 7	Decomposition, part 1	3	<b>No Labs (Fall Break)</b>	
Oct 9	Decomposition, part 2	3		
Oct 14	Intro to Biogeochemical Cycles	4	Aquatic Invertebrates Part 2	Indoor
Oct 16	<b>Quiz 3</b> C cycle	4		
Oct 21	N cycle	4	Chronic N	Indoor
Oct 23	P cycle_ part 1	4		
Oct 28	P cycle_ part 2	4	Intro to R	Indoor
Oct 30	Community Dynamics <b>Quiz 4</b>	5		
Nov 4	Heterogeneity in Ecosystems	5	Decomposition Lab Part 3	Outdoor
Nov 6	Landscape Dynamics, part 1	5		
Nov 11	Landscape Dynamics, part 2	5	Decomposition Lab Part 4	Indoor
Nov 13	Eutrophication, part 1	5		
Nov 18	Eutrophication, part 2	6	Decomposition Lab presentations	Indoor
Nov 20	Eutrophication Management Methods	6		
Nov 25 & 27	<b>Thanksgiving Break: No class or Labs</b>			
Dec 2	Ecology of Climate Change	6	<b>No Labs, semester ends</b>	
Dec 4	<b>Quiz 5 (Units 5 &amp; 6 cumulative)</b>	6		

## Laboratory Safety Rules

1. Students should not work in the laboratory alone.
2. Always wear appropriate shoes and clothing in the laboratory.
3. Do not eat or drink in the laboratory at any time.
4. Wear a lab coat, goggles, and gloves when appropriate.
5. Pull hair back to avoid having it interfere with laboratory work.
6. Know the location of the fire extinguisher, safety shower/eye wash, first aid kit, and exits.
7. Report accidents to laboratory instructors or teaching assistants.
8. Be very careful when using a sharp object such as a scalpel or a razor.
9. If chemicals are spilled,
  - a. Thoroughly flush with water the body parts or clothing that have been in contact with chemicals. Use the safety shower if the damage is extensive and eyewash if anything is spilled into someone's eyes.
  - b. Work with the instructor or the teaching assistant and the Chemical Hygiene Officer to clean up spills on the bench or the floor.
  - c. Instructor should fill out appropriate safety reports in consultation with the Chemical Hygiene Officer.
10. In case of fire:
  - a. If clothing is burning- STOP, DROP, and ROLL. Have the person walk slowly to the safety shower and pull on the ring.
  - b. A fire on the lab bench or the floor may be put out with a fire extinguisher. Call for help from instructors or teaching assistants.
11. Wash minor cuts or burns with cold water and apply band-aids or burn ointment.
12. Be sure to consult with the instructor regarding where to dispose of chemicals, biohazardous waste, sharp objects, recyclables, etc.
13. Clean the lab bench at the end of each laboratory period and wash hands.

## Statement on the use of generative AI

Intellectual integrity is vital to an academic community and for my fair evaluation of your work. All work completed and/or submitted in this course must be your own and completed in accordance with the University's Guidelines on Academic Integrity. **You may not engage in unauthorized collaboration or make use of ChatGPT or any other generative AI applications at any time.**

## Disability Services and Accessibility

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, drsrecep@pitt.edu, (412) 648-7890, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course. You can find more information on the [Office of Disability Resources website](#). DRS will determine reasonable accommodations for this course, but it is your responsibility as a student to send those accommodations to the instructors through the DRS portal.

### Statement on Classroom Recording

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

### Academic Integrity Policy:

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity (see below). Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to a quiz or exam, including dictionaries and programmable calculators.

If I have evidence that a student has cheated in my course, the minimum consequence will be a zero on the assignment or quiz. For specifics of what I consider cheating on assignments and quizzes, see the assignment instructions on Canvas. ***The data presented in lab reports and presentations must be your own data, even if it does not represent what was expected. Any student who plagiarizes, improperly cites, or fails to provide proper attribution for more than one passage of written text, whether on writing assignments, quizzes, exams, or reflections, will have committed an academic integrity violation.*** For questions on proper citation practices, visit <https://guides.library.utoronto.ca/bio153/citation>, and for a citation how-to guide, visit <http://www.citationmachine.net/ecology/cite-a-journal>. To learn more about Academic Integrity, visit the [Academic Integrity Guide](#) for an overview of the topic. If you have any questions regarding these policies, I encourage you to contact me.

### Copyright Notice

***While lectures and other materials from this course are posted online, they are all the intellectual property of the University of Pittsburgh. You may not share any of these materials online, by hardcopy, or via email.*** Course materials may be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to University policy and procedures, prohibits unauthorized duplication or retransmission of course materials. See [Library of Congress Copyright Office](#) and the [Library Copyright Toolkit](#). Posting any class materials originating from your professor on study sites like Chegg and CourseHero violates the University of Pittsburgh policy and Pennsylvania laws.

### E-mail Communication Policy

Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address. To forward e-mail sent to your University account, go to <http://accounts.pitt.edu>, log into your account, click on **Edit Forwarding Addresses**, and follow the instructions on the page. Be sure to log out of your account when you have finished.

### **Student Opinion of Teaching Surveys**

Students in this class will be asked to complete Student Opinion of Teaching Surveys for their TA and the professor. Surveys will be sent via Pitt email and appear on your Canvas landing page during the last three weeks of class meeting days. Your responses are anonymous. Please take time to thoughtfully respond, and your feedback is important to me.

### **Geology and Environmental Science Department Diversity Statement:**

Students, faculty, and guests represent diverse perspectives, backgrounds, and experiences, which enrich our research and educational environment. Individuals of all races, colors, ancestries, genders, marital status, familial status, ages, backgrounds, beliefs, ethnicities, gender identities and expressions, national origins, religious or political affiliations, sexual orientations, abilities, and other visible and non-visible differences are welcomed in this class. We urge all to be mindful in this classroom and to feel responsible for creating a space that is intellectually rigorous and is a respectful, welcoming, and inclusive environment for everyone. No demeaning or discriminatory behavior will be permitted. If you feel uncomfortable, please feel free to approach me during or after class to discuss the situation.

In this class, we will have the chance to indicate the name that we prefer to be called and, if we choose, to identify pronouns with which we would like to be addressed. Please approach me if you have such preferences, and I will do my best to address and refer to all students accordingly and support classmates in doing so as well. I will endeavor to use gender-inclusive and nondiscriminatory language in all course communication and materials. Your suggestions for how to improve the effectiveness of the course for you personally or other student groups are encouraged and appreciated. Our faculty is committed to communicating with students without judgement. In addition, if any of our class meetings conflict with your religious events, please let me know so arrangements can be made.

### **University of Pittsburgh Diversity and Inclusion Statement:**

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, see: <https://www.diversity.pitt.edu/civil-rights-title-ix-compliance/policies-procedures-and-practices>.

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator by calling 412-648-7860 or e-mailing [titleixcoordinator@pitt.edu](mailto:titleixcoordinator@pitt.edu). Reports can also be filed online: <https://www.diversity.pitt.edu/make-report/report-form>.

You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).