

# ESCI 30: Biological Principles of Environmental Science

Summer II 2024 Syllabus

## Course information

**Course time:** T/Th 9:00AM - 12:30PM [class meetings only; no sections]

**Course location:** Physical Sciences 110

### Instructor

**Instructor:** Aubrey Trapp, PhD Candidate Ocean Sciences (she/her)

**Instructor email address:** [ajtrapp@ucsc.edu](mailto:ajtrapp@ucsc.edu)

### Office hours

**Aubrey's office hours:** 1:30 - 2:30 Th or by appointment (email me)

**Location:** EMS D402 or [Zoom](#)

Office hours are for everyone! Here are some ways that students use office hours:

- Review reading/homework assignments
- Review class material
- Work on the final project
- Ask general questions about biology / college / career experiences

## Learning objectives

Learning objectives for ESCI 30 are designed to help you learn foundational concepts in biology that will set you up for success in your future studies and/or a career in environmental science. While the topics discussed in this course are geared towards environmental science, many of the skills we will practice are transferable across all STEM fields.

1. **Demonstrating foundational knowledge of biology\* and the main principles of life on Earth:** To include principles of cells, energy flow, genetic inheritance, evolution and biodiversity.
2. **Connecting biological and physical Earth systems through illustrations and/or written descriptions:** To include community structure, nitrogen cycle, and carbon cycle.

3. **Applying biological concepts to current events in environmental science:** To include climate change, agriculture, pollution, Indigenous traditional knowledge.
4. **Engaging with professional science:** To include designing and assessing scientific investigations, evaluating appropriate sources, practicing effective science communication.

\*Biological concepts are drawn from the American Association for the Advancement of Science *Vision and Change in Undergraduate Biology Education* report. These state that all undergraduates should have an understanding of the following:

- A. *Evolution:* The diversity of life evolved over time by processes of mutation, selection, and genetic change.
- B. *Structure and function:* Basic units of structure define the function of all living things.
- C. *Information flow, exchange, and storage:* The growth and behavior of organisms are activated through the expression of genetic information in context.
- D. *Pathways and transformations of energy and matter:* Biological systems grow and change by processes based upon chemical transformation pathways and are governed by the laws of thermodynamics.
- E. *Systems:* Living systems are interconnected and interacting.

## A note about this course and syllabus

ESCI 30 was substantially redesigned in 2023 to use fully open-source resources (meaning you don't have to pay for anything) and to include a lot more hands-on activities. I am excited about the revisions and new activities that we've included in the course. Because this version of the course is still new, I really appreciate your patience and understanding if it evolves throughout the quarter. The assigned readings for later weeks may change, and I'm also open to adapting the content to what you are specifically most interested in learning more about. I will keep you posted on any updates, and they will also be reflected in this syllabus.

## Readings and Reference materials

This course does not require you to purchase or obtain any texts or other resources. We will draw from a variety of open-source resources including the textbook [Concepts of Biology](#). These will also be linked on Canvas.

## What to bring to class

We will do a lot of active work together in class. Please bring pens/pencils (something to write with), a notebook (something to write on), and a laptop/tablet/phone (something with internet), and anything else you need to work and learn comfortably.

Summer classes are extremely condensed, and our class meeting time is scheduled for three and a half hours! I'll try my best to break up the time with lectures, activities and brain/body breaks to keep us all awake and moving. Please feel free to bring snacks or drinks to fuel your learning as long as they are not disruptive to the group.

## Grading Breakdown

ESCI 30 does not have formal exams. Your grade will be determined as follows:

- 40% Scientific Poster Project**
- 20% Mini-mind-quests (MMQs)**
- 20% Attendance**
- 20% Class Participation**

Conversions of number grades to letter grades will be posted later in the quarter.

## Scientific Poster Project

The largest part of your grade for this course will be determined by assignments related to the Scientific Poster Project. The Poster Project is designed for you to apply content from readings and lectures to a topic of interest in environmental science. Environmental Science is a HUGE field, and students in this course generally have diverse and wide-ranging interests. Throughout this project, I will encourage you to explore your chosen topic in-depth while applying biological concepts and gaining skills in professional science communication.

### Graded components

The project will include 10 milestone assignments throughout the session. Milestones are weighted equally at 10 pts. each. Milestone assignments will generally be submitted through Canvas. Due dates for milestone assignments are designed to ensure that you can successfully complete the project. You may complete the milestone assignments early, and I will work to get feedback to you as soon as possible after an assignment is submitted. Be kind to your future self and try not to leave things to the last minute. If you feel like you are falling behind, please contact me as soon as possible so we can make a plan to get your back on track.

Use this table to keep track of milestone deadlines. Detailed assignment information will be posted in Canvas.

Due: End of Week 1

Milestone #1: Topic approval

Due: End of Week 2

- Milestone #2: Source Reflection
- Milestone #3: Article approval & Annotated Bib
- Milestone #4: Abstract and discussion post

Due: End of Week 3

- Milestone #5: Outline research article
- Milestone #6: Schematic Figure

Due: End of Week 4

- Milestone #7: Peer Review Outline
- Milestone #8: Reproduce Figure

Due: End of Week 5

- Milestone #9: Poster Final Draft
- Milestone #10: Poster Presentation

## Mini-Mind-Quests (MMQs)

Weekly assigned readings will be posted on Canvas and linked from the syllabus. MMQs (beginning of class) are intended to reinforce key material from lectures and readings, not quiz your memorization of small details. MMQs will be ~5 questions, individual, and closed notes. Proper preparation for MMQs will ensure that you will be on the same page with classmates about the content being discussed during class. MMQs may also include check-in questions about the course (no wrong answers). Plan to spend about 1.5 - 2 hours per class with the assigned reading materials. If you do the assigned reading, participate in discussions, and come to class you should do well on the MMQs. Off days happen for everyone, so your lowest 2 MMQs will be dropped from the final grade.

## Attendance

**Attendance for the full duration of each class meeting is required for full credit.** This attendance policy is meant to encourage learning by engaging with peers and the instructor about course content rather than performance on high-stakes exams. As you can see from the grading policy above, attendance and class participation make up more than a third of your overall grade for the course.

### Absences for illness or other reasons

Every student will be excused for one absence during the session without requesting special permission. In other words, you can miss one class and still get a 100% attendance grade, no questions asked. Due to the fast-paced nature of the course, missing part of a class will still count as a full absence.

Please do not come to class if you are sick. I deeply appreciate you showing consideration for everyone in the classroom by staying home when you do not feel well. This is a great time to use your excused absence; going to class when you're sick is no fun anyway!

If life intervenes and you need to miss more than one class during the session, please reach out to me to discuss your situation.

## Class Participation

**In addition to attending class, participation in class activities is required for full credit.** Class activities are designed to reinforce topics from the lecture and support collaboration with your peers. Activities may include but are not limited to scientific investigations, group discussions, group demonstrations, peer reviews, and written reflections. More information about activities will be provided in the canvas module for each class meeting.

If you have to miss a class activity, please communicate with your instructor to see if an alternative assignment is available. Not all class activities will have an alternative assignment, so please communicate any planned absences with me as soon as possible. Your one excused absence only applies to the attendance portion of your grade and does not extend to participation in class activities.

## Community Guidelines for Class Participation

Some suggested guidelines recommended by our staff and collated from Centers of Teaching and Learning at the University of Michigan, Columbia University, Cornell University, and UC Berkeley are listed below:

- Listen respectfully, without interrupting.
- Listen actively and with an ear to understanding others' views. (Don't just think about what you are going to say while someone else is talking.)
- Criticize ideas, not individuals. We all can learn something from each other, even if your views don't necessarily align.
- Avoid blame, speculation, and inflammatory language.
- Allow everyone the chance to speak. If you feel put on the spot, ask for a little extra time or "come back to me."
- Avoid assumptions about any member of the class or generalizations about social groups. Do not ask individuals to speak for their (perceived) social group.
- We are accountable for our words and their impact.
- Personal information that comes up in the conversation should be kept confidential.

## Instructor Communication Policy

The best way to get help with anything related to the course is in class—please ask questions before, during, and after class!—or in office hours. I especially encourage you to come to office hours to ask questions about the course content.

So that I can prioritize student emails, please include "ESCI 30" in the subject line. I'll probably respond within the same day, but please have patience when corresponding during evenings or weekends. So that I can help you be successful in class, extension requests must be communicated at least 24 hours before the due date except in case of emergency. Requests will be approved on a case-by-case basis. I understand that you all have full lives outside of class, and emergencies do happen. Please notify me as soon as possible so that I can check on your wellbeing, and we can make a plan together for the remainder of the session.

## Late Work Policy (To Due or Not To Due)

Assignments submitted through canvas will have automatic due dates. **You will lose 0.8% of a point every hour after the due date.** This is meant to create an incentive for you to turn in work as soon as you finish it, even if you just miss the deadline. If you turn it in a few minutes late you will get essentially full credit. This deduction equates to about 20% per day (so you can get 80% for one day late, 60% for two days late, etc.) You won't get any credit for work submitted more than 5 days late. The late work policy is designed to keep everyone on track to successfully complete the course in 5 weeks and ensure that I can provide timely feedback on your assignments. If at any point you start to feel overwhelmed, please talk to me ASAP so we can find a solution together.

## Accommodations and accessibility

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student who requires accommodations to achieve equal access in this course, please affiliate with the DRC. All students are encouraged to learn more about DRC services by contacting DRC by phone at 831-459-2089 or by email at [drc@ucsc.edu](mailto:drc@ucsc.edu). For students already affiliated, make sure that you have requested Academic Access Letters, where you intend to use accommodations. You can also request to meet privately with me at the start of the quarter to talk through how we can implement your accommodation to ensure your access and full engagement in this course.

Please let me know if there are ways to make the class more accessible for you, whether or not you are also receiving DRC accommodations. Unfamiliar with Canvas because you're a new transfer student? Bring your laptop/tablet/phone to any of our office hours and we'll walk you through it (and welcome to UCSC!) Lost childcare at the last minute? Kiddos are welcome in class—no need to ask permission, just bring them and participate however works for you. These are just a few examples to encourage you to let me know how we can best support you during this quarter.

## Academic integrity

Many of you are finishing your time at UCSC and possibly interested in a career related to the environment. You and I may share a lot of values, like caring about the communities we live in, and wanting to leave the world better than we found it. There is no better way to start living those values than by approaching your education with integrity. Don't cheat, and don't help others cheat. Desperation about grades and confusion about what constitutes plagiarism are the two main reasons why students commit academic integrity violations.

Students often don't plan to cheat, but do so out of desperation on high-stakes assignments to get a better grade. In ESCI 30 your grade is calculated from many assignments, attendance, and class participation to reduce anxiety from high-stakes assignments. Another reason

students get into trouble is genuine confusion about what constitutes academic misconduct. Some common examples are explained in the table below.

## ChatGPT and other AIs

It's fine to use these tools when your assignments encourage you to use AI, or if you need to check something after first writing the assignment in your own words.

It is not fine to use AIs to generate your assignment responses unless you are explicitly told to do so; that is considered plagiarism. And as you'll see in this course, AIs are also not always very accurate about science.

Reference table for what tools and materials you can and cannot use

Tools and Materials	In-Class Activities	Homeworks
Textbooks	Yes, but cite the source	Yes, but cite the source
Your own class notes	Yes	Yes
Reputable Websites (such as .org's, .edu's, and /.gov's)	Yes, but cite the source	Yes, but cite the source
Discussions in office hours	Yes	Yes
Conversations with your classmates	Yes	Yes, but responses must be in your own words
AI tools (such as ChatGPT, Bard)	Only if instructed to do so	Only if instructed to do so or after you have completed the assignment in your own words
Your work from past classes	No	No
Paid homework services (such as Chegg)	No	No

I expect you to be familiar and comply with UCSC's policies and codes of conduct related to academic integrity, which are outlined in The Navigator (<http://registrar.ucsc.edu/navigator/>) and the UCSC Student Policies and Regulations Handbook (<http://deanofstudents.ucsc.edu/student-conduct/student-handbook/>).

Assignments with plagiarized material will immediately receive no credit and student misconduct will be reported to the University administration. Plagiarism includes, but is not limited to, recycling your own writing from previous courses; copying work from a classmate; using online services to write your work, such as AI tools; and copying text you found online—even a brief



phrase or sentence—without citing it. **If you have any questions about whether something constitutes plagiarism, please ask.**

## Intellectual property

The materials in this course are the intellectual property of their creators. As a student, you have access to these materials for the purpose of learning, engaging with your peers in the course, completing assignments, and so on. In turn, you have an obligation to only use course materials for purposes associated with the course. For instance, you are not permitted to share, upload, stream, sell, republish, share the login information for, or otherwise disseminate any of the course materials, such as: video and audio files, assignment prompts, slides, notes, syllabus, simulations, datasets, discussion threads. Conversely, any materials created solely by you (for example, your videos, essays, images, audio files, annotations, notes) are your intellectual property and you may use them as you wish.

## Schedule of lectures and assigned readings

A note about assigned readings: These are aimed to introduce some biological concepts for the first time which we will then cover in lecture. Keep in mind that this is not a memorization-based course. When you are reading, focus on being sure you understand the key concepts (for example, “could I explain in words how cells divide?”) rather than the jargon (memorizing G1, S, and G2 phase). The chapter summaries and review questions can help with this.

This schedule will be updated with any changes throughout the course.

Week	Topics covered	Assigned readings <u>Due Before Lecture</u>
1	<p><b><u>Tuesday 7/30:</u></b></p> <p><b>Lecture 1:</b> Syllabus, Course overview</p> <p><b>Lecture 2:</b> Origins of life, Cells, Domains of Life, Prokaryotes vs. Eukaryotes</p> <p><b><u>Thursday 8/1:</u></b></p> <p><b>Lecture 1:</b> Macromolecules of life</p>	<p><b><u>Tuesday:</u></b> Come to class ready to learn!</p> <p><b><u>Thursday:</u></b> Required Reading:</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Concept of Biology 2.2 Water</li><li><input type="checkbox"/> Concept of Biology 2.3 Biological Molecules</li></ul>

	<p><b>Lecture 2:</b> Principles of membranes</p>	<p><input type="checkbox"/> Concept of Biology Ch 3 (all)</p>
2	<p><b><u>Tuesday 8/6:</u></b></p> <p><b>Lecture 1:</b> Spending energy (Respiration)</p> <p><b>Lecture 2:</b> Acquiring energy (Photosynthesis)</p> <p><b><u>Thursday 8/8:</u></b></p> <p><b>Lecture 1:</b> Diversity of Life, Evolution</p> <p><b>Lecture 2:</b> Biodiversity, Life history</p>	<p><b><u>Tuesday:</u></b> Required Reading:</p> <p><input type="checkbox"/> Concept of Biology: Chapter 4 (not 4.5) How Cells Obtain Energy</p> <p><input type="checkbox"/> Concept of Biology: Chapter 5. Photosynthesis</p> <p><b><u>Thursday:</u></b> Required Reading:</p> <p><input type="checkbox"/> Concept of Biology: Chapter 12. Diversity of Life</p> <p><input type="checkbox"/> Concept of Biology: 11.2 Mechanisms of Evolution</p> <p><input type="checkbox"/> Concept of Biology: 11.4 Speciation</p> <p><input type="checkbox"/> Concept of Biology: 11.5 Common Misconceptions about Evolution</p> <p><input type="checkbox"/> Concept of Biology: Chapter 21 Conservation and Biodiversity</p>
3	<p><b><u>Tuesday 8/13:</u></b></p> <p><b>Lecture 1:</b> Physiology</p> <p><b>Lecture 2:</b> Ecology</p> <p><b>Special Topic:</b> Patrick Daniel - Squid Dissection</p> <p><b><u>Thursday 8/15:</u></b></p> <p><b>Lecture 1:</b> Ecosystems and the</p>	<p><b><u>Tuesday:</u></b> Required Reading:</p> <p><input type="checkbox"/> Concept of Biology: Chapter 16</p> <p><input type="checkbox"/> Concept of Biology: 19.2 Population Growth and Regulation</p> <p><input type="checkbox"/> Concept of Biology: 19.4 Community Ecology</p> <p><input type="checkbox"/> "Inky Mollusc Mystery" Derby et al. 2007</p> <p><b><u>Thursday:</u></b> Required Reading:</p> <p><input type="checkbox"/> Concept of Biology: Chapter 20 Ecosystems and the Biosphere (not 20.2)</p>

	<p>Biosphere</p> <p><b>Special Topic:</b> Field Trip 11-12:30</p>	
4	<p><b><u>Tuesday 8/20:</u></b></p> <p><b>Lecture 1:</b> Genetics</p> <p><b>Lecture 2:</b> Reproduction</p> <p><b>Special Topic:</b> GMO's</p> <p><b><u>Thursday 8/22:</u></b></p> <p><b>Lecture 1:</b> Central Dogma</p> <p><b>Lecture 2:</b> Central Dogma cont.</p>	<p><b><u>Tuesday:</u></b> Required Reading:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Concept of Biology: 9.1 The Structure of DNA</li> <li><input type="checkbox"/> Concept of Biology: 6.1 The Genome</li> <li><input type="checkbox"/> Concept of Biology 6.2 The Cell Cycle</li> <li><input type="checkbox"/> Concept of Biology: 18.1 How Animals Reproduce</li> <li><input type="checkbox"/> Concept of Biology: Chapter 7. The Cellular Basis of Inheritance</li> </ul> <p><b><u>Thursday:</u></b> Required Reading:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Concept of Biology: Chapter 9 Molecular Biology</li> <li><input type="checkbox"/> Concept of Biology: 10.3 Genomics and Proteomics</li> </ul>
5	<p><b><u>Tuesday 8/27:</u></b></p> <p><b>Lecture 1:</b> Mar Arroyo Guest Lecture - Carbon Cycle</p> <p><b>Lecture 2:</b> Earth challenges</p> <p><b><u>Thursday 8/29:</u></b></p> <p><b>Lecture 1:</b> Presentations</p> <p><b>Lecture 2:</b> Presentations</p>	<p><b><u>Tuesday:</u></b> Required Reading:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Concept of Biology: 20.2 Biogeochemical Cycles</li> </ul>