

Agroecology & Sustainable Agriculture

Environmental Studies 130A/L, Summer 2024

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This is a draft syllabus and subject to change.

Course Description:

Official description: "Ecological concepts and principles are applied to the design and management of sustainable agroecosystems. Alternatives for agriculture are discussed in terms of ecosystem structure and function"

This course combines lecture, discussion, and case studies to explore the biological, physical, and chemical components of and their interactions in agroecosystems. We will also be addressing the sociocultural aspect of agroecosystems in their broad sense, as people throughout the food system affect what and how we grow food, fiber, and fuel, and people are also affected in many ways by our food systems. We will start with looking at plants, a key part of agricultural production, and the abiotic factors that affect them. We will then look at biotic factors and the roles of heterotrophs in agroecosystems. We'll move from there to system-level interactions, including genetic resources, types of diversity, and disturbance. We will apply these concepts to developing more sustainable, justice-centering food systems, and the roles of different forms of technology in this field.

Learning Objectives:

Coming out of this class, I hope you have new eyes for seeing agricultural fields as agroecosystems, that when you see a field, you will think about the origin of its soil and how its structural and biological components and the way it is managed determine the rhythms of nutrient availability to plants. Looking at a growing crop, you will be able to visualize how water, gases, and energy are moving through the plants, and how the plants are affecting one another. Presented with two different agroecosystems, you will know what kinds of questions you would want to ask about their diversity and why that diversity matters to the people directly involved with those two systems, but also why that diversity matters on a landscape scale. You will be able to read about agricultural technologies – new or old – and make well-informed guesses on their purpose in agroecosystems, which components they affect, and why their sociocultural context matters. You will know why what we eat and how it is grown matters in this pivotal time for our environment and humanity.

In more formal language, at the end of this course you will be able to:

describe the key abiotic and biotic factors of agroecosystems and their interactions

describe and analyze nutrient flows in and through agroecosystems

apply the ecological concepts of population ecology, diversity, and species interactions to agroecosystems

analyze forms of agricultural technology in the context of their function in agricultural systems and their potential sustainability

describe different examples of agroecosystems and their sociocultural contexts in the Central Coast, the Central Valley, and throughout the world

describe field research methodologies used by agroecologists, including sampling and analysis of soil nitrogen and soil moisture, Leaf Area Index, and weed and crop biomass, and explain why these matter in agroecosystem management

Course Components:

Required reading

The recommended course text is Gliessman, S.R. *Agroecology: The Ecology of Sustainable Food Systems*. Additional readings, including journal articles, will be in the weekly Canvas modules.

Class participation

We strive for active learning in this class, weaving lecture, discussion, and group activities, in addition to our highly participatory field trips. I'm convinced of the importance of talking as part of student learning, and we'll do that in small groups, including during class time, during a portion of the midterms, and optionally for the technology study presentation and paper.

The evaluation of your participation will be based on attendance in class and on your contribution to the class activities and small groups. If you are sick, please stay home, and I'll work with you to help you figure out a plan for making up the work.

Assignments & group project

We will regularly have short in-class collaborative assignments as well as outside-of-class assignments while we're traveling. These will help you process and apply the concepts we're learning. We also have one final writing and cooking collaborative project for the class, which will be done in groups.

Technology study

By yourself or with a partner, you will conduct an analysis of a sustainable agriculture technology and present your analysis in a 1500-word paper and a poster. Details of the case study will be on Canvas.

Coursework grading

Lecture:

Class participation: 10%

Technology study paper: 20%

Technology study poster: 10%

Assignments: 30%

Final group project: 30%

Lab:

Lab participation: 25%

Lab observations: 20%

Decolonizing photosynthesis: 10%

Final long lab report: 45%

A note on timeliness: Timeliness is a form of self-care for you, to help avoid being overwhelmed by accumulated work later. It's also care for others around you, including instructors.

Late assignments will receive a deduction of 10% per day (24 hrs or portion thereof) to a 50% penalty, so it's always worth it to still turn in an assignment late! If something comes up that is

going to cause a problem with submitting an assignment on time, please talk with Katie.

Student hours for class: The 5-unit lecture portion of class requires approximately 150 hours of work over the quarter. This includes 30 hours of class time, 25 hours of readings, 45 hours of preparing the technology study, and 45 hours of homework assignments and the final project. The 2-unit lab part of class requires 60 hours of work over the quarter. This includes 24 hours of class time, 5 hours of weekly assignments, and 31 hours preparing the final report, including entering and working with data.

Academic accommodations: UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me privately during my office hours or by appointment, preferably within the first two weeks of the quarter. At this time, I would also like us to discuss ways we can ensure your full participation in the course. I encourage all students who may benefit from learning more about DRC services to contact the DRC at [831-459-2089](tel:831-459-2089), or at drc@ucsc.edu.

Inclusivity: I am continually working to learn about and unlearn the many biases that are part of my life, of which I am both aware and unaware, including racism, gender and identity bias, and ableism. This is not easy work, it's uncomfortable, and it's imperative that we dig into these hard places and decolonize our ways of knowing and increase our empathy for and connections with each other so that all voices can be heard in our work to care for this planet and its people. I am striving to create a space in which students from all backgrounds and with all perspectives feel included and are able to learn and achieve their goals in this course. I am also striving to bring to class materials and activities that embrace a diversity of perspectives, experiences, and positions. Your suggestions for making this learning community as inclusive as possible are encouraged and appreciated. Please let me know if you identify ways to improve the effectiveness of the course for you personally or for other students or student groups. If any of our class meetings conflict with your religious or cultural events, please let me know so that we can work together to make alternative arrangements.

CARE: UCSC Campus Advocacy, Resources & Education (CARE) believes that all people deserve to live and engage in an environment free from violence. The CARE program provides support, advocacy, resources and violence prevention education to the UC Santa Cruz community. We respond to the needs of students and others impacted by stalking, dating/domestic violence and sexual assault by providing free and confidential services. CARE also works collaboratively with students, faculty and staff to educate the campus community about the vital role that each of us has in preventing violence and creating social justice locally and globally.

Title IX: Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the Campus Advocacy Resources & Education (CARE) Office by calling (831) 502-2273. In addition, Counseling & Psychological Services (CAPS) can provide confidential, counseling support, (831) 459-2628. You can also report gender discrimination directly to the University's Title IX Office, (831) 459-2462. Reports to law enforcement can be made to UCPD, (831) 459-2231 ext. 1. For emergencies, call 911.

Faculty and Teaching Assistants are required under the UC Policy on Sexual Violence and Sexual Harassment to inform the Title IX Office should they become aware that you or any other student has

experienced sexual violence or sexual harassment.

Academic Integrity (thanks to UCSC's Center for Innovations in Teaching and Learning and UC Berkeley's Center for Teaching and Learning for structure & language)

Academic integrity is critical, both online and in person. It is the moral code of academia, the trust that researchers, scholars, and creative artists put in each other to do what is right and honest, even when no one is looking.

There are three key spheres of academic integrity in this class:

Plagiarism & self-plagiarism:

To copy text or ideas from another source (including your own for other courses and work purchased or copied from others) without appropriate attribution is plagiarism. This also applies to the discussion forums. For additional information on plagiarism, self-plagiarism, and how to avoid them, see, for example: <https://guides.library.ucsc.edu/citesources/plagiarism>

Collaboration & independence:

Working with peers to dig into the lecture and reading materials and discuss the weekly assignments and the final exam can be enjoyable and enriching. I encourage this effort to build community in the class and to study with others. However, the homework assignments and the final exam should be written independently and reflect your own knowledge and understanding. If your answer to a question on a homework assignment is highly similar to another student's answer because it demonstrates work you did together, you should acknowledge it as such, e.g., "Taryn, Suzanne, and I discussed the Pelletier et al. 2011 paper together over Zoom and this answer reflects that discussion." As a guideline, up to approximately 1/3 of your homework assignments may have such collaboration. Please speak with Katie or the TAs if you need clarification on this or want guidance for particular situations.

The technology paper may be done as a group of two; if you choose this, you will be asked to evaluate your contributions and your partner's contributions when you submit the paper.

Artificial Intelligence:

In this class, I ask that you complete your work *without* using AI-generated sources to augment, think through, or write your assignments.

There is one exception: you are welcome to use AI tools for pre-submission editing (spell-check and grammar-check) as long as you do not use them for thinking or drafting.

On rare occasions, I may create an assignment in which I ask you to critique content generated by AI; if this occurs, I will provide clear assignment-specific AI-use guidelines within the prompt.

If you submit work that appears to have been written using AI sources, I will ask you to meet with me to discuss your thinking and writing process. If, after our conversation, I conclude it's more likely than not that you did not personally complete an assignment you submitted under

your name, I may refer you to your college provost for further conversation.

If you have questions about AI use and/or proper attribution of other people's work, please come ask me! Scholarly citing is not particularly intuitive, and part of my role is to help you learn those conventions.

Overall, please refer to <https://ue.ucsc.edu/academic-misconduct.html> for the university's policy on Academic Dishonesty. Acts of academic dishonesty in this class will be reported to the department, to the Provost of your college, and to the Vice Provost and Dean of Undergraduate Education, and may result in an F on the assignment, dismissal from class with a final grade of F, and even suspension or expulsion from the university, depending upon the severity of the violation.

Course schedule

Dates	Topics	Activity or due date
July 15	Introduction, agroecosystem concept, plants	Welcome!
July 17	Light, temperature	Collect yield data; examine light in the canopy; decolonizing photosynthesis introduction
July 19	Humidity, rainfall, wind	Set up weed seedbank study and legume nodulation study
July 22	Soil & water, fires	Decolonizing photosynthesis write-up due; set up invertebrate traps
July 24	Biotic factors, environmental complex, heterotrophic organisms	Invertebrate observations
July 29	Species interactions in crop communities, agroecosystem diversity, disturbance, succession	Technology paper & poster due; set up weed seedbank and legume nodulation studies
July 31- Aug. 20	Traveling portion of the course	Take-home assignments due in this window, based on field trip experiences
Aug. 22 & 24	Landscape diversity, a sustainable food system	Revisiting our trials: what happened while we were away? Weed seedbank & nodulation report due