

## **SYLLABUS – BIOE/ENVS 125: Ecosystems of California** (Summer 2020)

This course will survey the diversity, structure and functioning of California's ecosystems through time and the ways they have influenced and responded to human activities and stewardship. Topics will include ecosystem drivers such as climate, soils, and land use history; human and ecological prehistory of the state; comparative marine, freshwater, and terrestrial ecosystem dynamics; and managed ecosystems such as range, fisheries and agriculture in California. The course will also emphasize important skills to understand as a scientist or consumer of scientific information, including data collection, exploration and analysis; library-based research on ecological topics; and scientific and science writing.

The course prerequisite for UCSC students is ENVS 100 (ENVS 125) or BIO 20C (EEB), but students in other majors can enroll by contacting the instructor with a transcript screenshot. Cross-campus and non-ENVS students need one course each in statistics, ecology (e.g. ENVS 25 or BIO 20C) and writing, and can request a permission code by e-mail. This course serves as one upper-division (natural science) course in the UCSC ENVS and EEB majors.

### **Teaching staff**

Instructor: Erika Zavaleta, [Zavaleta@ucsc.edu](mailto:Zavaleta@ucsc.edu)

Teaching assistants: Julia Harencar ([jharencar@ucsc.edu](mailto:jharencar@ucsc.edu)), Darryl Wong ([dgwong@ucsc.edu](mailto:dgwong@ucsc.edu))

Online office hours: One or more of the TAs will be available each week on Friday at 9-10 a.m. on Zoom for drop-in sessions. We are happy to provide additional meetings by appointment. To schedule time to go over course material, discuss careers/ internships/ other opportunities, or just connect to talk, send an email **to all of us** indicating desired length (10 or 20 min.) and giving us at least 3 options that are *at least 24 hours out*.

### **Course website and components**

Course Website: Enrolled students can begin the class on 6/22/20. Login at <https://canvas.ucsc.edu/courses/34971>

This course consists of (1) content materials (video field trips and narrated slide lectures) organized into 30 topic units, each with a quiz and one or more short writing prompts; (2) a statistics tutorial and assignment to build your skills with data analysis; and (3) a final exam.

### **Readings**

The readings for the class will be drawn mainly from *Ecosystems of California*, edited by Harold Mooney and Erika Zavaleta. You should purchase the book in the format you prefer, either hard copy or as an e-book. The book is also available free online through the UCSC library site and is on reserve in hard copy at the UCSC Science library. Additional readings and resources will be provided in the form of online documents and/or sites.

### **Student Grading and Evaluation**

Students' achievements will be evaluated through (1) participation in video field trips and lectures, via responses to writing prompts in each video and slide lecture, (2) participation in the lab sessions and submission of the statistics analysis lab, the field research data and the field

research paper; (3) quizzes focused on informational content from the lectures and readings (one for each unit; and (4) a final exam.

### Grading Breakdown

Lecture/ video field trip written responses	35%
Unit quizzes	33%
Statistics lab	7% (participation 2%, assignment 5%)
Field exercise and paper	15% (data 3%, participation 2%, paper 10%)
Final exam	10%

### Interacting with Teaching Staff

Most of your work in this course will be independent, but staff are available in a variety of ways to support you. You'll first meet us during an online welcome session at the beginning of the quarter, where we'll tell you a little about ourselves and give you time to ask questions. A discussion forum will run all quarter, a place where you can both ask and answer questions and which course staff will follow and chime in on when helpful. You will also interact with staff during workshops for research laboratory exercises, in which the course staff will help you navigate data exploration, analysis, and formal reporting from the field projects. Finally, we will always be available by regular UCSC e-mail, Canvas email, or Piazza (discussion software within the course interface) and will aim to respond to you within 24 hours, or by the other side of the weekend or holiday.

### Course schedule

The course includes 30 units organized into 5 modules, and with an introductory research lab and a field exercise tailored to the locations of enrolled students. The table on the next page gives you a course schedule overview with reading assignments and due dates for assignments. Although the online structure is set up to allow work at your own pace, you must complete modules by the deadlines. Each module becomes available *after* you have completed the previous ones.

**We recommend that you tackle the unit contents in the following order:** field trip(s) first, to get a look at the ecosystem in question and a sense of key characteristics and features, followed by the lecture – to guide you to the main points, then the reading – to reinforce the main points from lecture and delve into more detail – then the unit quiz.

The units need to be completed in order. Do not open the quiz before completing the other unit contents! **The quiz within each unit, once opened, will only remain open for 40 minutes.** All quizzes and the final exam are open-book, open-note, but they are too long in relation to the time available for you to look up every answer – you will want to review the material so that you are ready to deliver it mainly on your own. Quizzes, NOT the final, can be repeated once each for a new grade.

### Academic integrity

In this course, all written work submitted is expected to be your own work, in your own words. Ideas, facts, paraphrased text or quotations taken from other sources next to be cited and referenced as they would in any academic research assignment. For the written responses to

questions in each unit, we expect you to use your own words, not those from the readings or videos. All quizzes and the final are open-book, open-note in the course, but you are expected to complete them on your own, without help from others. Violations of these expectations will result in penalties starting with loss of credit for the assignment in question. Please ask us if you have any questions about this, or refer to pages 1-3 and 18 of the UCSC Code of Student Conduct (<http://deanofstudents.ucsc.edu/student-conduct/student-handbook/pdf/100.0-code-of-student-conduct.pdf>)

**Late assignments:** late module syntheses and research lab assignments will be penalized 10%/day unless you obtain an extension in advance, in writing from the instructor or TA.

### **Field Exercises**

You will be going out to collect some basic field data to contribute to a course-wide dataset about ecological patterns. A key to being able to assimilate information outdoors is comfort.

- Eat and drink water before and during field trips. Things like nuts, cheese, fruit, or chocolate are nice and portable. Take water - even if it's just a 16-oz bottle for this brief field exercise.
- Dress in layers, so garments can be added or subtracted as necessary to maintain body temperature in cold, windy weather. Even in summer, bring a jacket or sweatshirt for that fog and wind. Wear sturdy pants (shorts can be a disaster in the field - think spines, poison oak, etc.) and closed shoes with socks and some traction, like sneakers. Carry a warm hat and a sun hat (e.g. baseball cap).
- Consider lip protection, sunscreen, and sunglasses for bright, sunny days.
- Take a backpack of some kind. If you're collecting data on paper, a clipboard or a notebook and a couple of writing implements make sense - I often drop one by accident and need the second. You'll need your smartphone or a tablet for data collection apps, too, and a copy (digital or paper) of the lab assignment.

<b>TOPIC</b>	<b>READINGS</b>	<b>Deadline</b>
Live introduction (online meeting room) - recording will be posted	Course syllabus	June 24, 5:30-6 p.m. PST
<b>Module 0: INTRODUCTION</b>	*M&Z = Mooney & Zavaleta	June 26
Unit 1: <b>Introduction to California's ecosystems and this course</b>	M&Z Ch. 1	
<b>Module 1: ECOLOGICAL DRIVERS</b>		July 6
Unit 2, <b>Climate and Atmosphere</b>	M&Z Ch. 2; Ch. 7 pp. 107-117; Ch. 14	
Unit 3, <b>Fire as an Ecosystem Process</b>	M&Z Ch. 3	
Unit 4, <b>Geomorphology and Soils</b>	M&Z Ch. 4; McPhee, "Los Angeles Against the Mountains" (reading avail. in Canvas)	
Unit 5, <b>Population and Land Use</b>	M&Z Ch. 5; Ch. 10 pp. 169-177	
Unit 6, <b>Oceanographic Drivers</b>	M&Z Ch. 6	
Unit 7, <b>Biological Diversity and Invasions</b>	M&Z Ch. 11, 13	
<b>LAB MEETING: ANALYZING ECOLOGICAL RELATIONSHIPS</b>	Participation required; makeup assignment available	July 10, 5-6 pm PST
<b>Module 2: MARINE ECOSYSTEMS</b>		July 16
Unit 8, <b>The Offshore Ecosystem</b>	M&Z Ch. 16	
Unit 9, <b>Shallow Rocky Reefs and Kelp Forests</b>	M&Z Ch. 17	
Unit 10, <b>Intertidal</b>	M&Z Ch. 18	
Unit 11, <b>Estuaries</b>	M&Z Ch. 19	
Unit 12, <b>Sandy Beaches</b>	M&Z Ch. 20	
Unit 13, <b>Coastal Dunes</b>	M&Z Ch. 21	
<b>SUBMIT LAB EXERCISE</b>	Enter responses directly into course interface	DUE July 14, 11:59 p.m.
<b>LAB MEETING: FIELD DATA EXPLORATION &amp; HYPOTHESIS TESTING</b>	Participation required (data submission + attendance; makeup available)	Data due 7/16; meeting July 17, 12-1:30 PST
<b>Module 3: AQUATIC AND MONTANE</b>		July 24
Unit 14, <b>Wetlands</b>	M&Z Ch. 31	
Unit 15, <b>Lakes</b>	M&Z Ch. 32	
Unit 16, <b>Rivers</b>	M&Z Ch. 33	
Unit 17, <b>Montane Forests</b>	M&Z Ch. 27	
Unit 18, <b>Subalpine Forests</b>	M&Z Ch. 28	
Unit 19, <b>Alpine Ecosystems</b>	M&Z Ch. 29	
<b>FIELD PAPER DUE</b>		July 31, 11:59 p.m.

<b>Module 4: LOWLAND TERRESTRIAL ECOSYSTEMS</b>		August 4
Unit 20, Coastal Sage Scrub	M&Z Ch. 22	
Unit 21, Grasslands	M&Z Ch. 23	
Unit 22, Chaparral	M&Z Ch. 24	
Unit 23, Oak Woodlands	M&Z Ch. 25	
Unit 24, Coast Redwood Forests	M&Z Ch. 26	
Unit 25, Deserts	M&Z Ch. 30	
<b>Module 5: MANAGED SYSTEMS AND STEWARDSHIP</b>		August 12
Unit 26, Marine Fisheries	M&Z Ch. 35	
Unit 27, Forestry	M&Z Ch. 36	
Unit 28, Range Ecosystems	M&Z Ch. 37	
Unit 29, Agriculture	M&Z Ch. 38	
Unit 30, Urban Ecosystems	M&Z Ch. 39	
<b>Final exam available to take</b>		August 13-14

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 week of the Summer 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 DRC by phone at 831-459-2089 or by email at [drc@ucsc.edu](mailto:drc@ucsc.edu)

### Computers and Data Analysis

For this class you will need:

- Reliable computer
- Reliable internet connection
- Webcam and a microphone (built-in or peripheral)
- Modern web browser (Firefox, Safari, or Chrome)
- Word or similar word processing software
- Excel or similar data entry and manipulation software
- Google Drive to share data and documents
- Other required software will be available on the course website

### Course Accommodations to Ensure Access for All Students

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you have not already done so, I encourage you to learn more about the many services offered by the DRC. You can visit their website (<http://drc.ucsc.edu/index.html>), make an appointment, and meet in-person with a DRC staff member. The phone number is [831-459-2089](tel:831-459-2089) or email [drc@ucsc.edu](mailto:drc@ucsc.edu).

### **Learning Objectives for the Course**

Students will be able to describe the interacting forces that underlie the evolution and maintenance of California's exceptional diversity of ecosystems. Students will be able to describe the characteristic components of California's major ecosystems and the processes that give rise to and maintain this character. Students will be able to compare the relative contributions of these processes to shaping different ecosystem types and to describe how research in California's ecosystems has contributed to general ecological theory. Students will be able to critically evaluate management, restoration and conservation approaches proposed for California's diverse ecosystems. Students will be able to research, individually and collaboratively, specific topics in the ecology and stewardship of California's ecosystems in greater depth. Finally, students will be able to analyze and evaluate tradeoffs between the human benefits derived from California's ecosystems and their degradation.

### **Major-specific Learning Outcomes Addressed**

This course addresses the following learning outcomes of the Environmental Studies major at UCSC:

2. Describe the structure and functioning of major physical and ecological components of the earth's systems.
3. Access and analyze a complex literature addressing specific topics in environmental studies, and evaluate the usefulness and limitations of individual sources of information.
4. Demonstrate effective oral and written communication skills.

This course addresses the following learning outcomes of the Ecology and Evolutionary Biology major at UCSC:

1. Students will demonstrate broad-based knowledge of the fundamentals of Ecology, Behavior, Evolution and Physiology and the relationships among these disciplines.
3. Students will demonstrate skills in identifying, accessing, comprehending and synthesizing scientific information, including interpretation of the primary scientific literature. This includes understanding key questions and hypotheses, interpreting results and conclusions, and evaluating quality through critique.
5. Students will demonstrate an ability to understand and apply fundamental quantitative skills, including models and statistical analyses, so as to properly interpret published research and apply such skills in their own research.
6. Students will demonstrate the ability to communicate original scientific work in the form of a scientific paper, as well as in oral or poster presentations.