

SYLLABUS – ENVS 125: Ecosystems of California (Spring 2016)

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. Cross-campus and non-ENVS students need to have taken one course each in statistics (with lab), ecology and writing, and can request a permission code from the instructor by providing transcripts indicating that these courses have been completed successfully. This course serves as one upper-division natural science course in the UCSC ENVS major.

Teaching staff

Instructor: Erika Zavaleta, Zavaleta@ucsc.edu

Teaching assistant: Elissa Olimpi, eolimpi@ucsc.edu

Online office hours: Based on low participation in scheduled online office hours, we will offer 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 both of us indicating whether you want to schedule 10 or 20 minutes 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 6/20/16 at login.uconline.edu

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) two field laboratory exercises designed to be done on your own, each followed by data-sharing, a data analysis and writing, a writing assignment designed to help you develop your scientific writing and data reporting skills; 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 your prefer, either hard copy or as an e-book (<http://www.ucpress.edu/book.php?isbn=9780520278806>). 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 lab discussion sessions and performance on the written lab assignments; (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	30%
Unit quizzes	30%
Research lab participation (online)	5%
Two lab assignments	20% (5%/ 15%)
Final exam	15%

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 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 the workshops for research laboratory exercises, in which the course staff will help you navigate data exploration, analysis, and formal reporting. Finally, we will always be available by e-mail and will aim to respond to you within 24 hours, or by the other side of the weekend or holiday.

Meetings for the course (introduction, both lab workshops) will be via Adobe Connect; you will receive a link once the course is underway to logon to the meeting site.

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.

Late assignments: late module syntheses and research lab assignments will be penalized 10%/day unless you obtain an extension in writing from the instructor or TA. Please make sure that you have access to JMP well in advance of the research lab assignments (download for free at UCSC to your computer, and available at campus computer labs throughout the UC system to our knowledge). **Neglecting to arrange JMP access in advance will not earn an extension.**

TOPIC	READINGS	Deadline
Live introduction (online meeting room)	Course syllabus	June 22, 8-8:30 p.m. PST
Module 0: INTRODUCTION	*M&Z = Mooney & Zavaleta	June 23
Unit 1: Introduction to California's ecosystems and this course	M&Z Ch. 1	
First lab exercise assigned		June 22
First lab workshop		June 24, 12:30-1:30 PST
First lab exercise due		June 27
Module 1: ECOLOGICAL DRIVERS		July 5
Unit 2, Climate and Atmosphere	M&Z Ch. 2; Ch. 7 pp. 107-117; Ch. 14	
Unit 3, Fire as an Ecosystem Process	M&Z Ch. 3	
Unit 4, Geomorphology and Soils	M&Z Ch. 4; McPhee, " <u>Los Angeles Against the Mountains</u> " (reading avail. in Canvas)	
Unit 5, Population and Land Use	M&Z Ch. 5; Ch. 10 pp. 169-177	
Unit 6, Oceanographic Drivers	M&Z Ch. 6	
Unit 7, Biological Diversity and Invasions	M&Z Ch. 11, 13	
Module 2: MARINE ECOSYSTEMS		July 12
Unit 8, The Offshore Ecosystem	M&Z Ch. 16	
Unit 9, Shallow Rocky Reefs and Kelp Forests	M&Z Ch. 17	
Unit 10, Intertidal	M&Z Ch. 18	
Unit 11, Estuaries	M&Z Ch. 19	
Unit 12, Sandy Beaches	M&Z Ch. 20	
Unit 13, Coastal Dunes	M&Z Ch. 21	
Module 3: AQUATIC AND MONTANE		July 22
Unit 14, Wetlands	M&Z Ch. 31	
Unit 15, Lakes	M&Z Ch. 32	
Unit 16, Rivers	M&Z Ch. 33	
Unit 17, Montane Forests	M&Z Ch. 27	
Unit 18, Subalpine Forests	M&Z Ch. 28	
Unit 19, Alpine Ecosystems	M&Z Ch. 29	
Second lab exercise assigned		July 22
Second lab exercise part 1 due	Methods section, data	July 31
Second lab workshop		Aug. 1, 12:30-2:30 PST

Module 4: LOWLAND TERRESTRIAL ECOSYSTEMS		August 1
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	
Second lab exercise due	Lab paper	Aug. 8
Module 5: MANAGED SYSTEMS AND STEWARDSHIP		August 10
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	
Final exam available to take		August 11-12

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

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
- JMP statistics software (available through ITS for free to UCSC students: <http://its.ucsc.edu/software/jmp/>. Also available on most UC-wide campus computers.
- Other required software will be available on the course website

Field lab Assignments

Each student will complete two lab assignments, one to refresh statistics and one based on data collected during the field exercises and involving data exploration, graphing, statistical analysis, and formal scientific writing. Online workshops will be conducted to introduce and support each

assignment.

Field Exercises

You will be going out to collect some basic field data once over the course of the quarter to contribute to course-wide datasets about statewide and local ecological patterns. A key to being able to assimilate information outdoors is comfort.

- Eat and drink water before and during field trips. Things like peanuts, raisins, cheese, fresh or dried fruit, or chocolate are good snack choices. A quart-sized container of water is essential.
- Dress in layers, so garments can be added or subtracted as necessary to maintain body temperature in cold, windy weather. A shirt and outer sweater (preferably wool or fleece), along with a vest and/or windbreaker, make a good combination. You don't have to wear them all at once! Wear sturdy pants (shorts are often a disaster in the field) and closed shoes with socks and some traction, such as tennis shoes. Carry a warm hat and a sun hat (e.g. baseball cap).
- Gloves, not mittens, are a better choice, since it's easier to adjust the focus of your binoculars, take notes, and handle plants while wearing gloves.
- Consider lip protection, sunscreen, and sunglasses for bright, sunny days.

Things to Bring

- Watch: weatherproof and digital. Stopwatch function is also useful.
- Binoculars and hand lens if you have them.
- Field Notebook with pens and pencils
- Smart phone or digital camera
- Backpack
- Food and drink
- Field guides if you have them

POISON OAK: California has a lot of it, so you have to take precautions to avoid it. First, be able to identify it – look at some pictures online; leaves of three. Second, wear long pants and a long sleeve shirt if you are sensitive. Third, get it off yourself as soon as possible if exposed. Your first line of defense is to rinse off with COLD water as soon as possible. Buy some Tecnu if you get exposed; when you get back home, follow the Tecnu instructions followed by a cool shower. After your field trip, if exposed, wash your field clothes – separately if you can – to get the oil out of your clothing.

TICKS: Ticks are a possible chance to experience parasitism. While many can be around, and you are fairly likely to see them, you're unlikely to have one bite you if you follow some simple guidelines:

- wear long pants and socks (a light color helps you see them); brush off your pants if you walk into vegetation
- check for them when you get home -- on your clothes and in the places where they are likely to hit a barrier and stop (beltline, sockline, hairline/ neck, other nooks and crannies like armpits). Wash your clothes and take a shower.

If you do get a tick embedded in your skin, (1) estimate how long it has been there – if <24 hours, you are in good shape with respect to exposure to Lyme disease. (2) Use tweezers to gently and slowly pull the tick STRAIGHT out (no twisting or angles) to get all the parts out from under your skin. If you think it's been in for more than a day, keep it so that you can get it tested for Lyme if necessary. If you notice a red ring or swelling in the days to weeks after the bite, or if the tick could have been in for >24 hours, take yourself and the tick (in an envelope, e.g.) to the doctor.

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 three learning outcomes of the UCSC Environmental Studies major:

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 four learning outcomes of the UCSC EE 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.