

California Ecology and Conservation NRS BIOL/ENVS 188 Fall 2018 Syllabus

Science Instruction and Research Training for Undergraduates from across the University of California

Course Summary

Science is a process for generating new understanding. This process can be put into practice in any setting. *California Ecology and Conservation* trains students in the process and practice of science outdoors in protected wilderness areas of the University of California Natural Reserve System.

We provide instruction in the geology and climate of California and in the state's landscapes and biological diversity. We learn about ecological concepts and conservation challenges that are relevant to protected areas in California and to their value in society. We train in the basics of science and in the advanced toolkit: we practice and gain experience in observation and hypothesis formulation, hypothesis testing, research design, data collection, statistical analysis, graphing, presentation, and writing. Throughout the term, students put all this training to service in answering questions and solving challenges of their own conceiving. We work in every part of the scientific process, and we do it all outdoors in some of the most awe-inspiring wilderness areas the state has to offer.

The course begins with a visit to Blue Oak Ranch Reserve for orientation and basic training. We learn about California – its geology, climate, and natural history, its landscapes and biological diversity, and the conservation measures and protected areas implemented to preserve all of these in support of humanity. We explore the key role of hypotheses in science, and practice turning observations and ideas into testable hypotheses that can help us gain new understanding of the world. We discuss the different types of data and variables we can measure, appropriate sampling methods and equipment, and research designs to maximize rigor and minimize bias. We gain practice in statistics, setting up a spreadsheet for data entry, determining appropriate tests, and analyzing data to answer our hypothesis tests. We take several practice runs through that process of observation-hypothesis-sampling design-data collection-analysis for questions conceived by you the students, and then we pack up for a new site to put all these tools into practice in the first full research projects.

Our second stop is an extended visit to Angelo Reserve in Mendocino, where students will complete a full research project of their own design in groups of four to six members. To prepare for these projects, students undertake independent study into different components of the natural history of our new study site—the environment and landscapes, the plants, and the birds, herps, and mammals—and present this information to their classmates. We hike into the different landscapes to explore this natural history first hand, and read articles from previous research at the site to present among the class. Students break into groups to discuss research ideas and conduct pilot observations and measurements as they begin to devise new hypotheses for testing. Following discussions and peer feedback, students settle on a set of research questions, undertake background reading and more pilot study, and then propose their hypotheses and methods to the class for critical review and discussion. Research groups then have two to three days to complete their study while we provide further

instruction in statistics and presentation of research results in the slide-show format typical of professional conferences. The visit concludes with a symposium where each group presents its research to the class and special guests.

Our third stop is a visit to Yosemite Field Station for instruction and practice in crafting a research paper. After students complete their individual research papers they are treated to a well-deserved day off to reflect and recharge in one of the most beautiful places on earth. From Yosemite we head south to the Kenneth Norris Rancho Marino Reserve in Cambria. The second research project that students undertake here follows the same basic steps as the first, but with new research groups, new questions, and a wholly different set of ecosystems to explore. We continue instruction in statistics and introduce new concepts in ecology and conservation relevant to the site and surrounding landscapes, and we continue to work on the finer points of scientific communication and presentation. Upon completion of field research at Rancho Marino students will present their second research symposium.

For our third and final research projects, we will move the Anza-Borrego Desert Research Center east of the Sierras, where students marshal all of the training from term for a research project of their own choosing in research groups of their own choosing. Final research projects culminate with a full-length coauthored paper in the style of journal articles published in the professional literature and with a conference-style research presentation in a symposium for students and guests back at the Blue Oak Ranch Reserve.

By the end of term, students have gained training and practice in:

- Hypothesis formulation and research design
- Critical reading and presentation of scientific work
- Research proposal and peer review
- Scientific sampling and methods to minimize bias
- Statistical analysis, visualization, and graphing of scientific data
- Narrative composition and public speaking in science, and
- Scientific writing and presentation

The course concludes with a workshop focused on what comes next, providing instruction and demonstrations for pursuing career opportunities, constructing an effective resume or CV, and composing a successful cover letter and personal statement.

The following pages provide an overview of the course itinerary, describing the location, focus and major coursework of each day across term, and then a detailed syllabus that includes specific activities and readings from the three course references. There are multiple copies of these textbooks provided for students in our course library:

- Gotelli & Ellison's *Primer of Ecological Statistics*
- de Nevers, Edelman & Merenlender's *California Naturalist Handbook*
- Elzinga, Salzer, & Willoughby's *Measuring and Monitoring Plant Populations*

Blue Bold Font signifies graded coursework

Tentative Itinerary

Day	Day	Date	Reserve	Focus	Coursework (graded)
1	W	26-Sep	Blue Oak	Welcome; Course Overview; Logistics & Safety	
2	Th	27-Sep	Blue Oak	Natural History Exploration & Pattern Observation Activity	Instruction / Practicals
3	F	28-Sep	Blue Oak	Research: Hypotheses, Variables, Field Sampling, Data Collection & Statistics	Instruction / Practicals
4	S	29-Sep	Blue Oak	AM Research / Data Analysis	Field Research / Practicals
5	S	30-Sep	Blue Oak	Field Sampling & Data Collection	Field Research / Instruction
6	M	1-Oct	Blue Oak	Excel & Data Analysis Practical; Equipment Overview; Travel Logistics & Prep	Instruction / Practicals
7	T	2-Oct	to Angelo	Travel to Angelo	Travel Day
8	W	3-Oct	Angelo	Reserve Orientation, Natural History Pres's, Natural History Exploration	NH Presentations / Field Activities
9	Th	4-Oct	Angelo	Critical Reading and Presentation of Local Research	Instruction / Reading / Presentation
10	F	5-Oct	Angelo	Rapid Research Explorations of the Reserve	Field Research / Presentations
11	S	6-Oct	Angelo	Hypotheses & Pilot Studies for New Research at the Reserve	Pilot Research
12	S	7-Oct	Angelo	Proposals & Setup for Research Project #1	Research Proposals/Setup
13	M	8-Oct	Angelo	Research Project #1: Field Work	Field Research
14	T	9-Oct	Angelo	Conclude Research Project #1; Analysis & Statistics Tutorial	Field Research; Instruction
15	W	10-Oct	Angelo	Lec: Science Communication & Presentation / Stats Tutorial(Student led)	Data Analysis / Slide Preparation
16	Th	11-Oct	Angelo	Lec: Powerpoint Tips / Angelo Research Presentations	Instruction/ Research Presentations
17	F	12-Oct	to Yosemite	Yosemite Field Station Use & Safety	Travel Day
18	S	13-Oct	Yosemite	Writing Lecture & Practical / Populate Template	Instruction/Paper Preparation
19	S	14-Oct	Yosemite	Scientific Writing: WriteUp & Submit	Instruction/Paper Preparation
20	M	15-Oct	Yosemite	Scientific Writing: (Revisions Workshop) Peer Review + ReSubmit	First Research Paper
21	T	16-Oct	Yosemite	- Day Off -	
22	W	17-Oct	to Rancho	Rancho Marino Use & Safety	Travel Day
23	Th	18-Oct	Rancho	Local Natural History, Ecology & Conservation	Instruction / NH Presentations
24	F	19-Oct	Rancho	Critical Reading (with Paso Robles HS students)	Reading / Presentation
25	S	20-Oct	Rancho	Rapid Research Explorations (with Paso Robles HS students)	Field Research/ Presentations
26	S	21-Oct	Rancho	Hypotheses & Pilot Studies for New Research	Pilot Research
27	M	22-Oct	Rancho	Proposals and Pilot/Setup for Research Project #2	Research Proposals/Setup
28	T	23-Oct	Rancho	Research Project #2	Field Research
29	W	24-Oct	Rancho	Research Project #2	Instruction
30	Th	25-Oct	Rancho	Conclude Research Project #2; Analysis & Statistics Tutorial	Data Analysis / Slide Preparation
31	F	26-Oct	Rancho	Research Project #2 Presentations	Research Presentations
32	S	27-Oct	to Anza	Field Station Use and Safety	Travel Day
33	S	28-Oct	Anza	Local Natural History, Ecology and Conservation	Instruction / NH Presentations
34	M	29-Oct	Anza	Critical Reading and Presentation of Local Research	Reading / Presentation
35	T	30-Oct	Anza	Rapid Research Explorations of the Reserve	Field Research/ Presentations
36	W	31-Oct	Anza	Hypotheses, Pilot Studies & Proposals for New Research	Pilot Research
37	Th	1-Nov	Anza	Research Proposals / Begin Pilot Studies	Research Proposals / Setup Projects
38	F	2-Nov	Anza	Research Project #3: Final Projects	Field Research
39	S	3-Nov	Anza	Research Project #3: Final Projects	Field Research
40	S	4-Nov	Anza	Research Project #3: Final Projects	Field Research
41	M	5-Nov	Anza	Research Project #3: Final Projects	Field Research
42	T	6-Nov	Anza	Research Project #3 Concludes; Equipment Clean & Check	Conclude Field Research
43	W	7-Nov	to Sedgwick	Travel to Sedgwick; Data Sheet Check	Travel Day
44	Th	8-Nov	to Blue Oak	Travel to Blue Oak Ranch; Data Analysis Check	Travel Day / Data Checks+Analysis
45	F	9-Nov	Blue Oak	Background Reading, Write-up, and Slide Preparation	Write-Up/Slide Preparation
46	S	10-Nov	Blue Oak	Background Reading, Write-Up, and Slide Preparation	Write-Up/Slide Preparation
47	S	11-Nov	Blue Oak	Paper & Slide Preparation; Practice Pres; Bio 189 Conservation Presentations	Preparation; 189 Final Presentations
48	M	12-Nov	Blue Oak	Paper and Slide Preparation; Final Paper Submission (10pm)	Final Research Papers
49	T	13-Nov	Blue Oak	Career Workshop; Final Research Presentations; Course Evals	Final Research Presentations
50	W	14-Nov	to SJC	Course Conclusion and Departure	

Detailed Course Schedule

*Note that we can never anticipate prior to term what kinds of opportunities we will encounter as we travel the state and meet researchers in the field at the various reserves, so some specifics of the syllabus are subject to change in the interest of pursuing the richest possible whole-term experience.

Day	Day	Date	Topic	Readings
Day 1	Wed	26-Sep	Welcome and Overview at Blue Oak Ranch Reserve 3pm Arrive at Blue Oak Ranch, Campsite Setup 4pm Manager's Welcome and Introductions 6pm Dinner 8pm Course Overview, Structure, Logistics, and Safety	
Day 2	Th	27-Sep	Natural History, Observations, Ideas & Hypotheses 9am Orientation to Blue Oak Ranch Reserve 11am Blue Oak Ranch Reserve Natural History Exploration 4pm Hypothesis Development Practical 8pm Lecture: California Geology & Geography	de Nevers p. 1-3 p. 27-45
Day 3	Fri	28-Sep	Field Sampling & Data Collection 9am Research Design Practical: Variables, Measurements, & Data 11am Field Notebook & Data Collection 12pm Break 1pm Field Research 8pm Data Entry	Elzinga Ch 7 to p.144
Day 4	Sat	29-Sep	Statistical Analysis 9am Excel Tutorial & Data Exploration Practical 10am Data Analysis Practical 2pm Lecture: Intro to Ecological Statistics 8pm Lecture: Conservation in California	Gotelli p. 57-69 p. 74-77 p. 91-98 p. 164-166
Day 5	Sun	30-Sep	Sampling Design for Field Research 11am Intro to Sampling Design Field Activity & Equipment 11:30am Sampling Design & Field Research Practical 3:30pm Data Entry Practical 8pm Lecture: California Climate	Elzinga Ch 8 to p.188
Day 6	Mon	1-Oct	Sampling Design Lab + Statistical Analysis 9am Equipment overview & additional sampling methods 12pm Data Entry Practical 2pm Statistics Practical & Overview 4:30pm Travel logistics & Safety	Gotelli p. 239-253 p. 257-261 p. 289-298



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Day 7	Tues	2-Oct	Travel Blue Oak Ranch Reserve to <i>Angelo Reserve</i>
		9am	Clean Course-Use Facilities at Blue Oak Ranch
		11am	Depart for Angelo Reserve
		4pm	Angelo Use, Safety, & Manager's Welcome
Day 8	Wed	3-Oct	Angelo Natural History, Ecology, & Conservation
		9:30am	NH Presentations: Angelo's Flora, Fauna, & Landscapes
		12pm	Angelo Natural History Saunter
		8pm	Night Saunter & Herp Walk
Day 9	Th	4-Oct	Critical Reading & Presentation of Angelo Research
		9am	Lecture: California Flora
		10:30am	Articles Assigned, Independent Reading
		1pm	Article Reading-Group Discussions
		2pm	Prepare Article Presentations
		4pm	Article Presentations
Day 10	Fri	5-Oct	Rapid Research Exploration of Angelo Reserve
		9am	Morning Check-In & Gear Check
		10am	Rapid Research
		2pm	Prepare Rapid Research Presentations
		4pm	Rapid Research Presentations
Day 11	Sat	6-Oct	Hypotheses & Pilot Studies for New Research at Angelo
		9am	Research Groups Assigned
		10am	Pilot Study into Hypotheses & Methods
		by 12pm	Instructor Check
		12pm	Pilot Investigations & Background Reading
		5pm	Lecture: Best Practices for Research Proposal
		8pm	Prepare Research Proposal Presentations
Day 12	Sun	7-Oct	Proposals & Setup for Angelo Research Projects
		10am	Research Proposal Presentations
		12pm	Begin Field Research
Day 13	Mon	8-Oct	Equip & Set Out for Angelo Research Projects
		9-5pm	Field Research
		8pm	Conservation Discussion: Non-Native Trout
Day 14	Tues	9-Oct	Angelo Research Projects: Data Analysis & Graphing
		9-12pm	Field Research Concludes
		1pm	Data Entry & Preliminary Analyses
		2pm	Data Analysis Practical & Interpretation
		8pm	Graphing Workshop

Assigned
Articles



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Day 15	Wed	10-Oct	Science Communication and Research Presentations
		9:30am	Lecture: Best Practices for Science Communication
		10:30am	Narrative Formulation
		1pm	Narrative Instructor Check
		2pm	Prepare Research Presentations
Day 16	Th	11-Oct	Angelo Research Presentations
		9:30am	Lecture: Powerpoint Presentation Tips
		10am	Polish & Practice RP1 Presentations
		2pm	Angelo Research Symposium
Day 17	Fri	12-Oct	<i>Travel Angelo to Yosemite Field Station</i>
		8am	Clean Course-Use Facilities at Angelo
		10am	Depart for Yosemite Field Station
		5pm	Yosemite Use, Safety, & Manager's Welcome
Day 18	Sat	13-Oct	Scientific Writing: Research Project Papers
		9am	Lecture: Writing a Scientific Paper
		10:30am	Practical: Constructing a Narrative
		11am	Individual Work on Research Article Template
		12pm	Break
		2pm	Populate Introduction; Scope each Paragraph; Populate Methods
		8pm	Conservation Discussion: Bark Beetles
Day 19	Sun	14-Oct	Populate Research Paper from Article Template
		9am	Lecture: Scientific Writing - The Finer Elements
		11-5pm	Populate Results & Discussion from Article Template
		2pm	Mental Health Saunter
		8-10pm	Scientific Writing
Day 20	Mon	15-Oct	Angelo Research Paper Due
		9am	Lecture: Revision Workshop
		10am	Polish/Revise Papers
		12-3pm	Peer Review
		3-5:30pm	Revision
		8-10pm	Revision
		10pm	Manuscripts Submitted
Day 21	Tues	16-Oct	DAY OFF at Yosemite
Day 22	Wed	17-Oct	<i>Travel Yosemite to Kenneth S. Norris Rancho Marino Reserve</i>
		9am	Clean Course-Use Facilities at Yosemite
		11am	Depart for Rancho Marino
		5pm	Rancho Use, Safety, & Manager's Welcome
		8pm	Rancho Marino Reserve History & Ecology



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Day 23	Thurs	18-Oct	Rancho Marino Natural History & Ecology	
		9:30pm	Introduction to Rancho's Flora, Fauna, & Landscapes	
		11:30am	Rancho Marino Natural History Saunter	
		12:30pm	Intertidal Exploration (2.6' (low tide 1:14pm))	
Day 24	Fri	19-Oct	Critical Reading & Presentation of Rancho Marino Research	
			<i>with Paso Robles High School student visitors</i>	Assigned
		9am	Lecture: Disturbance, Succession, and Biodiversity	Articles
		10:30am	Articles Assigned, Independent Reading	
		12:30pm	Article Reading-Group Discussions	
		2pm	Prepare Article Presentations	
		3pm	Article Presentations	
Day 25	Sat	20-Oct	Rapid Research Exploration of Rancho Marino	
			<i>with Paso Robles High School student visitors</i>	
		9am	Rapid Research Groups Assigned	
		10am	Rapid Research	
		2pm	Prepare Rapid Research Presentations	
		4pm	Rapid Research Presentations	
Day 26	Sun	21-Oct	Hypotheses & Pilot Investigations for New Research at Rancho	
		9pm	Research Question Brainstorm + Assign Groups	
		11am	Begin Research Setup + Pilot Studies	
		3pm	Prepare Research Proposals	
Day 27	Mon	22-Oct	Proposals & Setup for Rancho Research Projects	
		9:30am	Research Proposals	
		9am-5pm	Field Research	
Day 28	Tues	23-Oct	Rancho Marino Field Research Projects	
		9-5pm	Field Research	
		8pm	Conservation Discussion: Abalone & Starfish Populations	
Day 29	Wed	24-Oct	Rancho Marino Field Research Projects	
		9-5pm	Field Research	
		8pm	Follow-Up Conservation Discussion on Marine Conservation	
Day 30	Thurs	25-Oct	Conclude Rancho Marino Field Research, Begin Data Analysis	
		9 - 12pm	Field Research	
		1:30pm	Data Entry & Preliminary Analysis	
		3pm	Statistics Tutorial	



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Day 31	Fri	26-Oct	Rancho Marino Research Presentations
		9am	Prepare Rancho Research Presentations
		3:30pm	Rancho Marino Research Symposium
Day 32	Sat	27-Oct	<i>Travel Rancho Marino to Anza Borrego</i>
		9am	Clean Course-Use Facilities at Rancho
		10am	Depart to Anza Borrego
Day 33	Sun	28-Oct	Natural History Explorations of the Anza Borrego
		9am	Manager's Welcome
		9:30am	NH Presentations: Anza. Flora, Fauna, & Landscapes
		11:30pm	Natural History Saunter
		4pm	Natural History Saunter Discussion
Day 34	Mon	29-Oct	Critical Readings of Anza Research
		9am	Lecture: Optimal Foraging Theory / Island Biogeography
		10:30am	Articles Assigned, Independent Reading
		12:30pm	Article Reading-Group Discussions
		1pm	Prepare Article Presentations
		3pm	Article Presentations
Day 35	Tues	30-Oct	Rapid Research Explorations of Anza Borrego
		9:30am	Rapid Research Groups Assigned
		11am	Rapid Research
		3pm	Prepare Rapid Research Presentations
		4pm	Rapid Research Presentations
Day 36	Wed	31-Oct	Hypotheses & Pilot Investigations at Anza Borrego
		9:30am	Brainstorm Hypotheses for Anza Research Projects
		11am	Refine Hypotheses & Recruit Research Groups
		1pm	Form into Research Groups
		2pm	Begin Pilot Investigations & Background Reading
Day 37	Th	1-Nov	Proposals & Setup for Anza Research Projects
		9am	Salton Sea Expedition
		4pm	Research Proposal Presentations p. 1
		8pm	Research Proposal Presentations p. 2
Day 38	Fri	2-Nov	Anza Borrego Research Projects
		9-5pm	Field Research

Day 39	Sat	3-Nov	Anza Borrego Research Projects
		9-5pm	Field Research
		8pm	Conservation Discussion: Tamarix Invasion
Day 40	Sun	4-Nov	Anza Borrego Research Projects
		9-5pm	Field Research
Day 41	Mon	5-Nov	Anza Borrego Research Projects
		9-5pm	Field Research
Day 42	Tues	6-Nov	Anza Borrego Research Projects Conclude
		9-2pm	Conclude Field Research & Begin Data Entry
		4pm	Marked Research Papers Returned
		5pm	Equipment Clean & Check
Day 43	Wed	7-Nov	<i>Travel Anza to Sedgwick Reserve</i>
		8am	Clean Course Use Facilities at Anza Borrego
		9am	Depart for Sedgwick Reserve
		4pm	Data Entry & Spreadsheet Check with Instructors
		4pm	Research Paper 1 Comments with Instructors
		8pm	Data Analysis Check with Instructors
Day 44	Thurs	8-Nov	<i>Travel Sedgwick Reserve to Blue Oak Ranch Reserve</i>
		8am	Clean Course Use Facilities
		9am	Depart for Blue Oak Ranch Reserve
		4pm	Analysis of Final Project Data
		8pm	Results Check with Instructors
Day 45	Fri	9-Nov	Final Research Project Data Analysis & Figure Preparation
		9-11am	Figure Preparation
		11am	Figure Checks with Instructors
		12pm	Narrative Framing & Background Reading
		4pm	Story Outline Check with Instructors
		8pm	Scope & Infill for Introduction
Day 46	Sat	10-Nov	Final Research Project Narrative Framing & Story Outline
		9:30am	Write-up and Background Reading
		12am	Complete Working Draft Paper; Take Mental Refresher Break
		1pm	Read & Edit Working Draft Paper, Revise with Research Group
		10pm	Submit Completed Final Draft Paper



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Day 47	Sun	11-Nov	Slide Preparation & Practice Presentations
		9-1pm	Slide Preparation & Practice with Research Group
		1-5pm	Individually Scheduled Practice Presentations with Staff
		8pm	Instructor Edited Papers Returned
		8pm	Bio 189 Conservation Student Presentations
Day 48	Mon	12-Nov	Revisions of Final Project Papers & Presentations
		All Day	Revisions of Final Project Papers & Presentations
		12-3pm	Individually Scheduled Practice Presentations with Instructors
		8pm	Submit Final Project Papers
Day 49	Tues	13-Nov	Career Skills; Final Presentations; Course Evaluations
		9:30pm	Careers, Cover Letters, & CV's Workshop
		11am	Course Evaluations
		1pm	Presentation Run-Throughs
		3pm	Final Project Presentations
Day 50	Wed	14-Nov	Course Conclusion & Departure
		9:30am	Clean Course-Use Facilities at Blue Oak Ranch Reserve
		11am	Goodbyes and Shuttle Departure for SJC

Evaluations & Grading

Chronological

Reserve Natural History Introduction	10%
Article Presentation #1	5%
Research Project #1 Presentation	10%
Research Project #1 Paper	10%
Article Presentation #2	5%
Research Project #2 Presentation	10%
Article Presentation #3	5%
Final Research Project (#3) Presentation	15%
Final Research Project (#3) Group Paper	20%
Class Conduct and Responsibility	5%
Collaborative Effort and Support	5%

By Assignments

Reserve Natural History Introduction	10%
Article Presentations (x 2)	15%
Research Project Presentations (x 3)	35%
Research Project Papers (1 solo + 1 group)	30%
Participation & Conduct	10%

EXAMPLE

Critical Conservation Issues in California NRS BIOL/ENVS 189 Fall 2018 Syllabus

Supplemental course for semester students enrolled in California Ecology and Conservation

Course Summary

The goal of this course is to illuminate the connections between ecological research and conservation practice in a rapidly changing world. To achieve this goal, you will conduct an in-depth exploration into the impact of a specific issue in conservation biology on a particular location or ecosystem in California. Through this exploration, you will gain an understanding of the importance of integrated research in solving complex environmental problems.

You will collect information on your topic of choice from a variety of sources including peer-reviewed journal articles, reports from governmental and conservation organizations, and the public media. You will synthesize ideas from across the readings, developing a thesis that incorporates these multiple perspectives. Your work will culminate in three main products 1) a group discussion, 2) an oral presentation 3) a well-referenced paper.

Before the field course begins, you are asked to select your top three topic choices from the list below, in order of preference. Non-listed alternative topics may be considered, but must be approved in advance. With guidance from your instructors, you will select peer-reviewed articles and media references (newspaper articles, local tv news reports, etc.) on your chosen topic to bring with you on the course. Additionally, you will develop discussion prompts, and a paper topic proposal. Once on the course, you will continue to develop your thesis with feedback from your instructors and peers.

Point Breakdown (100 Total)

Project proposal with annotated bibliography	20
Discussion prompts and discussion leadership	10
Peer Reviews of draft research papers	10
Oral presentation	30
Final research paper	30

Timeline

September 3: Email top three topic choices (in descending order of preference) to Tim (tijmille@ucsc.edu). Note that topics are determined on a first come, first served basis.

September 17: Submit project proposal with annotated bibliography. In one-three paragraphs, describe the issue's relevance to conservation in your location or ecosystem of focus, the stakeholders involved, potential conflicts of interest among these stakeholders, and potential solutions. Your bibliography should have a minimum of five peer reviewed articles and two media references. For each source, provide the full citation in the style of the Journal of Ecology (see the "Citation Formats" document). Then give a brief (two to five sentence) description of the central message of the source and how you plan to use it to build your thesis. Make sure to bring copies (print or electronic) of all your references on the course, as we may not have internet in all locations. You will receive instructor feedback during the first week of the course.

September 24: Submit five questions that will serve as prompts for a class discussion. The discussion will be centered around a research paper or case study that fits within your overall thesis topic. For each question, provide one to three introductory sentences that contextualize or clarify what you are asking. Questions that highlight a controversy, compare different conservation methodologies, or frame the topic in a new perspective can be particularly effective.

September 26: The course begins

Various dates: Lead a group discussion based on your chosen research paper or case study. Be prepared to provide background on the topic during a brief introduction to the group.

October 28: Draft of research paper is due. You will conduct peer-reviews on the following day and receive these along with instructor comments.

November 5: Submit final research paper.

November 11: Give a ten-minute oral presentation about your topic.

Notes

You will have time to work on your paper during the course, but starting an outline and writing as much as possible before the course begins is strongly recommended. You will have substantial guidance from your instructors throughout the process of researching and writing your topic.

Potential Research Topics

Spotted owl and/or Northern Goshawk conservation in Northern California forests

Adaptive management in selection logging regimes in Northern California forests

Marijuana Farm regulation and eradication in Northern California forests

Non-native trout fisheries in California's streams

Nutrient pollution and/or invasive algae in California's streams

Bark beetles and tree mortality in the Sierras

Reductions in snow pack and/or phenological shifts in the Sierras

Water storage and/or water allocation in California

Wildlife/human conflict in California's National Parks

Impacts of tourism (waste accumulation, traffic, meadow destruction) in Sierra's National Parks

Coastal erosion and/or coastal wetland subsidence

Impacts of invasive grasses/forbs on California's Grasslands

Abalone and/or Sea Star population declines

Coastal fisheries and Marine Protected Areas

Oceanic effects of climate change

Solar and/or Wind Energy productions in California's deserts

Impacts of off-road vehicles in California's deserts

Big Horn Sheep conservation in California's deserts

Tamarix (salt cedar) invasion California's desert riparian habitats

Salton Sea conservation and management