BIOE 158L: Field Methods in Marine Ecology

Tentative Syllabus, Summer 2022

Course Overview:

This course will serve as an introduction to coastal marine ecosystems and the field methods used to describe them. Because this topic is expansive, we will focus on observational studies (as opposed to ecological experiments), and we will use the rocky intertidal zone as a study system. Although these studies and this system have unique features and considerations, we will frame our discussion in a manner that communicates topics generally applicable to other ecological studies and ecosystems.

Course Learning Outcomes:

The purpose of this course is to introduce students to 1) the diversity of coastal ecosystems of the California coast and 2) commonly employed sampling approaches used to characterize them. Marine ecosystems are inherently complex, and exhibit variation across a wide range of spatial and temporal scales. As a result, accurately documenting patterns of abundance and distribution requires basic knowledge of the natural history of these systems and an understanding of how to design and conduct careful and rigorous observational studies.

In addition to gaining this knowledge, students will gain practical skills through carrying out a complete research project. The major product students will produce in this class will be a short research paper summarizing an observational study we will devise and conduct as a class. Students will (1) formulate hypotheses, (2) design and implement observational surveys, (3) collect, analyze, and interpret data, and (4) summarize and present findings. Importantly, students will receive experience working collaboratively in a research team.

Learning Statement

Your success in this class is important to us, and we believe all students deserve the opportunity to succeed in this course. We all learn differently, and each have our respective challenges and needs. We will solicit student feedback throughout the quarter to better understand how the course material is being received and will adjust our teaching approach as necessary. If there are aspects of this course that you feel are preventing you from learning or exclude you, please let us know as soon as possible. Together we can develop strategies to meet both your needs and the requirements of the course.

Meeting Dates and Location:

2022/07/25 – 2022/08/26
Tuesday and Thursday 0900 - 1230
Coast Bio 115

Teaching Team:

Instructor:
Niko Kaplanis
nkaplanis@ucsc.edu
Office Hours: Tuesday and Thursday 1300 – 1400, OHB 255

TA: Dr. Ana Valenzuela Toro
anmavale@ucsc.edu
Office Hours: TBD

Course Website:
https://canvas.ucsc.edu/courses/55191

Other Important Websites:
NOAA Tide Predictions, Santa Cruz
https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=9413745

National Weather Service Marine Forecast: Point Arena to Piedras Blancas
https://www.ndbc.noaa.gov/data/Forecasts/FZUS56.KMTR.html

Course Schedule:
Week 1:
- 07/26: Lecture: Course Introduction, and Introduction to the California Coast

- 07/28: Lecture: Diversity of California's Coastal Marine Ecosystems
- Field Site Description Lab: Terrace Point

Week 2:
- 08/02: Lecture: Sampling Design: Site Selection and Classification, Sampling units, Layout, and Replication
- Introduction Writing Workshop

- 08/04: Lecture: History of Coastal Ecosystem Research at UC Santa Cruz
- Sampling Unit Assembly Lab
- Methods Writing Workshop

Week 3. *Dates Tentative:
- 08/12: Field Survey: Biodiversity Sampling and Long-Term Monitoring at Terrace Point

- 08/13: Field Survey: Class Sampling Designs at Terrace Point

Week 4:
- 08/16: Lecture: Introduction to Data Analysis and R
- Data Analysis Lab

- 08/18: Final Project Writing Workshop

Week 5:
- 08/23: Guest Lecture: Time Series and Long-Term Monitoring

- 08/25: Final Project Defense

Course Operation:

This course has four major components: Lectures (including participation), Labs, Homework / Readings, and a Final Project.

Lectures will take 60 – 90 minutes and will incorporate interactive activities. I am a firm believer that the more engaged students are, the more interesting the material will be, so come prepared to participate. We will then take a short break (~ 10 mins.) before reassembling for lab.

Labs will take 90 – 120 minutes and are designed to expand upon topics covered during lectures, as well as to put into practice skills relevant to the study of coastal marine ecosystems. During week 3 we will have two field sampling days at a local rocky intertidal reef (Terrace Point) during which students will collect data using existing long-term monitoring field methods as well as designs we have devised as a class for their final projects.

Homework will consist of short activities and / or readings paired with reading responses.

The final project will be a scientific paper developed as a class throughout the quarter. This will include all the elements of a scientific manuscript, including an introduction with citations of primary literature, methods, results synthesizing data collected during class field excursions, and a discussion. We will provide work on a particular question of interest as a class, but students will be expected to produce their own paper. Instructors will provide guidance throughout the quarter on how to effectively write scientific content.

For excellent writing guidance, I highly recommend students obtain a copy of The Elements of Style, by William Strunk Jr. and E.B. White. While not a required, students may find it useful to reference Monitoring Rocky Shores, by Steve Murray, Richard Ambrose, and Megan Dethier. This is an excellent book on field survey design considerations for coastal marine ecosystems. I have a couple copies of this book that I can lend out during the quarter.

We will be using R during this course. I highly recommend students download both R and R Studio as soon as possible. Scripts will be provided for all data analysis, but it will be helpful for students to have basic familiarity with the operation of R Studio and basic coding.

Final Project Due Dates:

- 08/04: Introduction (including hypotheses)
- 08/12: Methods
- 08/18: Results
- 08/25: Discussion and Final Submission

Evaluation:

Students will be evaluated by each of these major criteria:

1) Participation (10%)
2) Labs (25%)
3) Homework (25%)
4) Final Project (40%)

Grading scale:

A: 100-90%
B: 89-80%
C: 79-70%
D: 69-50%
F: <50%