

SIOB 277 - Deep-Sea Biology Syllabus

The deep sea is Earth's largest habitat, representing >95% of space habitable for life. Largely under-explored and misunderstood, the deep sea can often be thought of as lifeless, homogenous, and impenetrable by human activity. This course will explore many facets of the deep sea. We will cover the history of exploration, the environment, faunal composition, zonation, diversity, physiology, ecology and microbiology of multiple taxa and deep-water settings. We will address the effects of climate change and human impacts in the deep sea.

Course Information - Winter 2022

Course Details	The course will consist of lectures of ~70-80 min, sometimes with a brief discussion at the end. Students are expected to read assigned readings before each lecture, attend class, and participate in discussion. Journal articles will be available on Canvas. Students are expected to participate in a class research cruise on R/V <i>Gordon Sproul</i> .
Meeting Details	Tuesdays & Thursdays, 9:30 - 10:50 AM. Sumner Auditorium (Google Maps). UCSD has mandated remote instruction through January 30, with in-person teaching to begin January 31. Zoom links will be announced in advance of each course on Canvas.
Credits	4
Course Website	https://canvas.ucsd.edu
Grading Mode	Letter grade or S/U
Instructors	Dr. Lisa Levin - llevin@ucsd.edu Dr. Anela Choy - anela@ucsd.edu
TA	Olivia Pereira - ospereir@ucsd.edu
Office Hours	Weekly TA office hours are available on Thursdays from 8:30 - 9:30 AM. TA office hours will be remote until January 18 (see Canvas for Zoom link) and then in Sumner Auditorium. Office hours with the instructors are available upon request, as needed. Please coordinate a meeting time with the instructors at least 72 hours in advance.

Assignments and Grading

Students taking this course to fulfill a program requirement should sign up for a letter grade. Otherwise, the course may be taken as Satisfactory/Unsatisfactory. The grade breakdown is provided below.

Assignment	Weight	Due Date
Quizzes x 3	45% (15% each)	Jan 25, Feb 15, March 8
Research Cruise Assignment	10%	Feb 22
Deep-Sea Futures & Challenger Forward Assignment	30%	Jan 27 (abstract); March 3 (final proposal)
Deep-Sea Science Communication Assignment at Class Symposium	15%	March 9 (due) Present on March 10
	100%	

Tentative Grading Scale

A = 90-100% (S) B = 80-89% (S) C = 70-79% (S) D = 60-69% (U) F = 59%-below (U)

Course Requirements

Lectures. Students are required to attend all lectures and come prepared to participate in discussions and/or class activities.

Assigned Readings. There is no formal textbook for this course but The Silent Deep by Tony Koslow (2007, The University of Chicago Press) can be used as a text for guidance. This book is out of print but used copies are available for purchase. Instead, readings will be assigned in advance of each lecture and students are expected to read assigned journal articles *before each lecture*. Readings will be available on Canvas.

Quizzes. There will be three short class quizzes based on lecture material and assigned readings (January 25, February 15, March 8).

Research Cruises. All students are expected to participate in a day-long research cruise aboard R/V *Gordon Sproul*. We have secured two cruises, one on February 5 (Saturday) and one on February 12 (Saturday), both underway from 0700 (0600 onboard the vessel at Nimitz Marine Facility), returning approximately at 2300. More information will be provided, including required cruise assignment (due February 22), required paperwork, and student cruise days.

Research Proposal (*Challenger Forward & Deep-Sea Futures*). Develop a research proposal that first explores the history of a subject relevant to the future of the deep ocean, and then proposes new science to advance knowledge of the subject. It can be related to deep-sea exploration, climate change, mining, fishing, energy extraction, microplastics, chemical contaminants, etc, but must include biology. Read about the subject, provide relevant background from the Challenger Report onward, identify unanswered problems/issues, propose hypothesis-based research and explain approach and methods (5 pages max). See Ramirez et al. 2011 (*PLoS ONE*) for some ideas. An abstract of your research topic and proposal is due on January 27 (or earlier). Final proposals are due on March 3 (or earlier).

Science Communication Project & Class Symposium. We will combine related proposals to form small groups that will generate deep-sea science communication projects for the general public. This can be a video, poster/art, music, poem, short story etc. and can be designed for use by social media like Instagram, TikTok, Twitter) or deep-sea network websites or blogs. These will be due on March 9 and will be presented in class on March 10, possibly in an extended class 8-11 AM.

Course Schedule

The following schedule is subject to change(s). Changes to be announced on Canvas as soon as possible.

Week	Date	Topic(s)	Activities & Due Dates	Instructor
1 REMOTE	Jan. 4, Tuesday	<ul style="list-style-type: none">• Course Overview• Introduction to the Deep Sea• History of Deep-Sea Biology		Dr. Levin
REMOTE	Jan. 6, Thursday	<ul style="list-style-type: none">• Deep-Sea Environments• Faunal Composition		Dr. Levin
2 REMOTE	Jan. 11, Tuesday	<ul style="list-style-type: none">• Benthic Communities• Zonation & Biogeography• Trophic Ecology• Size		Dr. Levin

Week	Date	Topic(s)	Activities & Due Dates	Instructor
REMOTE	Jan. 13, Thursday	<ul style="list-style-type: none"> Biodiversity Ecosystem Function 		Dr. Levin
3 REMOTE	Jan. 18, Tuesday	<ul style="list-style-type: none"> Animal-Sediment Interactions Protozoa Ecosystem Services 		Dr. Levin
REMOTE	Jan. 20, Thursday	<ul style="list-style-type: none"> Deep Pelagic Ecosystems & Communities 		Dr. Choy
4 REMOTE	Jan. 25, Tuesday	<ul style="list-style-type: none"> Light in the Water Column Bioluminescence Adaptations to the Midwater 	Quiz 1	Dr. Choy
REMOTE	Jan. 27, Thursday	<ul style="list-style-type: none"> Deep-Sea Microbiology 	Research Proposal Abstract Due	Dr. Doug Bartlett
5	Feb. 1, Tuesday	<ul style="list-style-type: none"> Methane Seeps 		Dr. Levin
	Feb. 3, Thursday	<ul style="list-style-type: none"> Hydrothermal Vents 		Dr. Levin
	Feb. 5, Saturday	<ul style="list-style-type: none"> Student Research Cruise 1 	<i>R/V Gordon Sproul</i>	Dr. Levin Dr. Choy
6	Feb. 8, Tuesday	<ul style="list-style-type: none"> Oxygen Minimum Zones Deoxygenation 		Dr. Levin
	Feb. 10, Thursday	<ul style="list-style-type: none"> Biogenic Reefs Ocean Acidification & Climate Change 		Dr. Levin
	Feb. 12, Saturday	<ul style="list-style-type: none"> Student Research Cruise 2 	<i>R/V Gordon Sproul</i>	Dr. Levin Dr. Choy
7	Feb. 15, Tuesday	<ul style="list-style-type: none"> Mesopelagic & Bathypelagic Processes 	Quiz 2	Dr. Choy
	Feb. 17, Thursday	<ul style="list-style-type: none"> Food Supply Benthic-Pelagic Coupling 		Dr. Choy
8	Feb. 22, Tuesday	<ul style="list-style-type: none"> Deep-Sea Energetics Physiology 	Research Cruise Assignment Due	Dr. Choy
	Feb. 24, Thursday	<ul style="list-style-type: none"> Seamounts, Canyons, and Trenches Ecology & Exploration 	*Meeting in Hubbs Hall 4500*	Dr. Choy
9	March 1, Tuesday	<ul style="list-style-type: none"> Deep-Sea Fisheries 		Dr. Choy
	March 3, Thursday	<ul style="list-style-type: none"> Whale Falls 	Research Proposal Due	Dr. Greg Rouse
10	March 8, Tuesday	<ul style="list-style-type: none"> Human Impacts in the Deep Sea Exploitation, Conservation, Policy 	Quiz 3	Dr. Levin Dr. Choy
	March 10, Thursday	<ul style="list-style-type: none"> Class Symposium (extended class period) 	Communication Assignment Due Mar. 9	Dr. Levin Dr. Choy