

**Biology 25: Marine Biology
Fall Term 2024
General Information**

Professor: Celia Y. Chen, Rm. 126 Class of '78 Life Sciences Center, HB 6044
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Graduate Teaching Assistant: Phoebe Colvin Oehmig, Ph.D. student, 1st floor lab, LSC
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Schedule: Lecture MWF 11:30-12:35 (11-period)
X-period, Tuesday 12:15-1:05

Location: Lectures and X-hours, 105 Life Sciences Center
(unless otherwise announced)

Office hours: C. Chen: M 2:30-3:30, W 2:30-3:30 (also by appointment which is encouraged!)
P. Oehmig after class MWF (also by appointment)

Course purpose:

The overall objective of the course is to explore the amazing range of ecosystems in the world's oceans and coastal areas, and to examine how abiotic (physical, chemical) and biotic factors (interactions with other living organisms) shape the ecological characteristics of organisms in these marine systems. We will also learn about the role of human interactions with these ecosystems and discuss some of the complexities of the current science/policy issues.

Required Books:

Textbook: Levinton, 2022, *Marine Biology* (paperback), Oxford University Press, 6th Edition. Reading assignments will be noted on each lecture outline. The pages listed in the attached syllabus below are only *tentative* assignments for the textbook (Levinton 2022) and do not include additional scientific papers and reports which will be assigned and handed out with each lecture.

X-period: X-Hours will be used for discussions of scientific papers and films.

Films: Films will be made available online so that you can view them at your leisure. For some topics, online video will also be assigned. Content of films and videos will be covered in exams.

Class Discussions: Class discussions will be held in a "jigsaw activity" format that will involve student "expert groups" that will focus on student becoming experts on individual papers (in the 1st discussion session). Members of those groups will present the content of their papers to other students in "mixed groups" and students will learn about a group of papers from their fellow students (in the 2nd discussion session). This format will facilitate small group learning and allow you to participate in informing your fellow students.

Taxonomy Lab: You will have one class period in the laboratory dissecting preserved samples of marine invertebrates and vertebrates. In this laboratory activity, you will learn the relationship of the anatomical features of each organism to their ecological function.

Hourly Exams: 2 hourly exams and a final exam (1st: 20%, 2nd: 25%, 3rd: 30%). For each exam, 90% of the content will be from lectures and required readings, 10% from films and discussions. Exam format (10-15 short essays).

Field Trip: Location Marine Biological Laboratory (MBL), Woods Hole MA, and Waquoit National Estuarine Research Reserve, Falmouth MA. Friday to Saturday, September 27-28th (6AM on 27th) to (6PM on 28th). The field trip will have three components: 1) going out on the research vessel, the *Gemma*, to sample for marine organisms; 2) visiting the Marine Resources Center (at MBL) where marine organisms are cultured for ecological and biomedical research; 3) visiting the field study sites of the Waquoit National Estuarine Research Reserve at a nearby beach and on a local salt marsh. This trip is not required but those who cannot participate will have a separate assignment.

Writing Assignment:

There will be a writing assignment involving research on a marine biology research topic of your choice. The assignment will involve investigating primary scientific literature on a topic of interest to you and developing a set of testable questions based on and supported by the current state of the research. The investigation will culminate in a short paper written in the style of a scientific proposal. The assignment will be due in the middle of the term and comprise 15% of the final grade.

Required Reading:

American Catch, Paul Greenberg 2014

This book will be the focus of a class discussion and a starting point for talking about the interaction between fisheries and marine ecosystems in the second half of the course. The book is about the history and current state of three different fisheries that were in the past sourced from coastal waters of the US but now are largely imported. The author discusses the links between our coastal waters and the ability of those waters to support fisheries that could provide seafood protein to the US. However, like many fisheries, the sources and customers are global as are impacts on the coastal environments on which they depend. We will have a class discussion on the science and the policy issues concerning these and other fisheries.

Group Presentations: There will be student group presentations on the scientific and policy issues surrounding three different fisheries. In each topic area, groups of students will represent industry, environmental advocates, or government regulators. Groups will turn in a summary of the major points of their presentation that will comprise 5% of the final grade. All of you will be responsible for material presented by all the groups.

GENERAL COURSE ISSUES

Special Accommodations: “Students requiring disability-related accommodations must register with the Student Accessibility Service office. Once SAS has authorized accommodations, students must show the originally signed SAS Accommodations/Consent Form and/or a letter on SAS letterhead to their professor. As a first step, if students have questions about whether they qualify to receive accommodations, they should contact the SAS office. All inquiries and discussions about accommodations will remain confidential.”

Religious Observances: Students may wish to take part in religious observances that fall during this academic term. Should you have a religious observance that conflicts with your participation in the course, please come speak with me before the end of the second week of the term to discuss appropriate accommodations.

Athletic Obligations: While it is important for you to meet your commitments to your athletic teams, it is also your responsibility to meet your academic ones. When missing class for athletic events, it is highly recommended that you meet with me or the TA, Phoebe Oehmig, to make up material covered in the lecture.

Honor Code: As with all courses, you are expected to follow the guidelines of *Sources, Their Use and Acknowledgment* that can be found on the internet at <http://writing-speech.dartmouth.edu/learning/materials/sources-and-citations-dartmouth>. The sections most relevant to this course are in the section, “What is plagiarism?” Citation formats for papers and projects will be discussed in class.

Technology Use: While use of laptops is permitted in class surfing the web is not. I strongly encourage you to refrain from engaging with technology in class unless it is related to course content. Web surfing and cell phone use is distracting to your classmates. Use of AI is not permitted unless part of the assignment.

Lecture Schedule

<u>Date</u>	<u>Topic</u>	<u>Assignment</u>
M 16 Sep	Introduction to Marine Systems	pp. 1-11, 46-78 <i>Paul Snelgrove</i> <i>TED talk</i>
Tu 17 Sep	How to use AI and search engines to write research proposals Lilley Linden, Science Librarian	
W 18 Sep	The World Oceans: Geologic and Physical Environment	pp. 12-26 <i>"Journey to the Ocean Floor"</i>
Coastal Margins		
F 20 Sep	Estuaries	pp. 28-31, 349-355 <i>"Poisoned Waters"</i> (Ches. Bay)
M 23 Sep	Salt Marsh Ecosystems and Sediments (Assign Jigsaw groups and papers)	pp. 310-331, 349-364 <i>Changing Seas: At the Water's Edge: The Salt Marsh</i>
Tu 24 Sep	Class discussion: Expert groups discuss their papers	<i>Papers to be assigned</i>
W 25 Sep	Rocky Intertidal – Habitat, Zonation, and Ecology	pp. 332-349, 272-277, 384-396 <i>"Blue planet: Tidal Seas"</i>
F 27-28 Sep	Field trip to Woods Hole MA (Sat.-Sun.)	
The Pelagic Zone		
M 30 Sep	Phytoplankton and Primary Productivity	pp. 155-159, 225-241, 244-247
Tu 1 Oct	Class discussion: Mixed groups share papers	
W 2 Oct	<i>Marine invertebrate Lab dissection</i> (LSC 104)	pp. 279-308
F 4 Oct	Presentation of Dissections Paper Assignment Discussion	
M 7 Oct	Zooplankton Communities	159-168, 199-208 223-225, 247-249
Tu 8 Oct	Class discussion: Expert groups discuss their papers	Papers TBA
W 9 Oct	Planktonic Food Webs and the Microbial Loop (Paper outline due)	pp. 246-247
F 11 Oct	Hour Exam I	
M 14 Oct	Nekton: Composition, Morphology, Populations	pp. 169-181 <i>"Ocean Drifters"</i>

Tu	15 Oct	Class discussion: Mixed groups share papers	Papers TBA
W	16 Oct	Marine Mammals: Organisms and Adaptations	pp. 181-189, 514-515 <i>Film: "Science of Whales"</i>
F	18 Oct	Marine Mammal Acoustics	<i>Reading TBA</i> <i>Peter Tyack TED talk</i> <i>Changing Seas:</i> <i>Vanishing Whales,</i> <i>Humpback Health</i>
M	21 Oct	Guest lecture: Dr. Dan Madigan, University of Windsor (Topic: Apex predator ecology)	
Tu	22 Oct	<i>Fisheries Group Meeting</i> (<i>Writing assignment due</i>)	
W	23 Oct	Discussion of "American Catch"	

Deep Sea Environments

F	25 Oct	Deep Sea Community Ecology: Cold Seeps and Hydrothermal Vents	pp. 426-450 <i>Changing Seas: Alvin: Pioneer of the Deep</i>
M	28 Oct	Mining in the deep ocean	<i>"The Blue Planet: The Deep"</i>
Tu	29 Oct	Class discussion: Expert groups discuss papers	Papers TBA
W	30 Oct	Coral Reefs: Environment and Community Interactions	pp. 396-422 <i>Film: "Blue Planet: Coral Seas"</i>

Tropical Marine Environments

F	1 Nov	Hour Exam II	
M	4 Nov	Coral Reef Disturbance	TBA
Tu	5 Nov	Class discussion: Mixed groups share papers	

Human Impacts on Marine Systems

W	6 Nov	Tale of Two Oil Spills: Exxon and BP	pp. 523-528, 530-538 <i>Changing Seas: A Decade after Deepwater</i>
F	8 Nov	Fisheries management	pp. 489-514 <i>"Empty Oceans Empty Nets"</i> Paul Greenberg TED Talk
M	11 Nov	Pollution in the Marine Environment Phoebe Colvin Oehmig (Graduate TA)	TBA
Tu	12 Nov	Harmful algal blooms	TBA

W 13 Nov Climate Change: Carbon Sequestration in the Oceans pp. 33-51, 544-547

F 15 Nov *Group Presentation*

M 18 Nov *Group Presentation*

Tu 19 Nov *Group Presentation*

FINAL EXAM – Date and time to be announced