

Biology 25: Marine Biology

**Fall 2020
General Information**

Professor: Celia Y. Chen, Celia.Chen@dartmouth.edu

Graduate Teaching Assistant: Elliott Steele, Elliott.P.Steele.GR@dartmouth.edu

Schedule: Lecture MWF 11:45-12:50 (D-period)
X-period, Tuesday 12:30-1:20

Office hours: C. Chen: By appointment and encouraged!
E. Steele (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, 2017, *Marine Biology* (paperback), Oxford University Press, 5th Revised International 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) 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 readings.

Films: Films will be made available online in the Course Media Gallery 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 quizzes.

Paper 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: In groups, you will learn about and present on the anatomical features of a marine invertebrate or vertebrate. You will teach the class about the relationship of the anatomical features of your organism to their ecological functions. This presentation will comprise 5% of the final grade.

Weekly quizzes: Weekly quizzes will be given on after Friday's class based on the week's lectures, required readings, films and discussions. Thirty minutes for each quiz will be given during a 4 hour

block of time on the weekend and the quiz will be "open book". Each quiz will comprise 8% of the final grade. Quiz format (3-5 short essays).

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 16% 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. There will be an essay assignment associated with reading this book.

Group Presentations: There will be student group presentations on the scientific and policy issues surrounding three different fisheries towards the end of the term. In each topic area, groups of students will represent industry, environmental advocates, or government regulators. Individuals within each group will turn in a summary of the major points of their presentation that will comprise 10% of the final grade. All of you will be responsible for material presented by all of the groups.

GENERAL COURSE ISSUES

Online teaching and learning: In this class, we are hoping to make it as close to an in-class experience as possible. We will have synchronous meetings for class and x-hour periods and we will all adhere to the same general rules of conduct as in in-person classes including:

- behaving professionally
- treating one another with courtesy and respect
- not using profanity or socially offensive language

Please join the Zoom classes from an appropriate surrounding (quiet location, e.g. not driving in a car). We intend for you to be fully present by participating with Zoom video turned on (if this is not possible, please let me know). We will be recording Zoom lectures each day for reviewing the material or in case for some reason you cannot attend.

Canvas: Course schedules, Zoom recordings, Powerpoint presentations, lecture outlines, media links, and all other course materials will be made accessible through canvas.

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.”

In this new online setting, please feel free to contact Professor Chen about any accommodations you may need to be successful in the class.

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 speak with Professor Chen before the end of the second week of the term to discuss appropriate accommodations.

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.

In this time of online learning, we will expect that all quizzes and individual assignments to be conducted without sharing information with classmates. Group assignments will of course require group interaction.

Lecture Schedule

Asterisk* denotes breakout groups

Blue text denotes Assignment to be handed in

Green text denotes QUIZZES

Purple text denotes guest lectures

<u>Date</u>	<u>Topic</u>	<u>Assignment</u>
M 14 Sep	Introduction to Marine Systems; Part 1	pp. 1-11, 46-73 <i>Paul Snelgrove TED talk</i> <i>"Journey to the Ocean Floor"</i>
Tu 15 Sep	Introduction to Marine Systems; Part 2	
W 16 Sep	The World Oceans: Geologic and Physical Environment	pp. 12-28 Ocean Current TED talk

Coastal Margins

F 18 Sep	Estuaries – where freshwater meets saltwater	pp. 28-32, 352-364 <i>"Poisoned Waters"</i> (Ches. Bay)
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QUIZ #1

M 21 Sep	Rocky Intertidal – Habitat, Zonation, and Ecology	pp. 317-340, 260-266 <i>"Blue planet: Tidal Seas"</i>
Tu 22 Sep	Class discussion: Expert groups discuss their papers*	<i>Papers to be assigned</i>
W 23 Sep	Soft Sediment Environ - Life habits and interactions	pp. 297-316, 334-338
F 25 Sep	Salt Marsh Ecosystems	pp. 341-349

QUIZ #2

The Pelagic Zone

M 28 Sep	Marine Organism Group discussions*	pp. 268-296
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Tu 28 Sep	Class discussion: Mixed groups share papers*
W 30 Sep	<i>Guest Lecture: Dr. Jennifer Burnaford, CSUF</i>

F 2 Oct	Presentations of marine organism anatomy to class Paper Assignment Intro
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QUIZ #3

M 5 Oct	Phytoplankton and Primary Productivity 211-234	pp. 145-149, 189-192, Readings TBA
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Tu	6 Oct	Class discussion: Mixed groups share papers*	Papers TBA
W	7 Oct	Zooplankton Communities <i>(Expert group paper outline due)</i>	pp. 149-158, 234-238 Secret life of plankton (TED)
F	9 Oct	Planktonic Food Webs and the Microbial Loop <i>Outline of individual paper due, schedule meeting with Prof.</i>	pp. 219-220

QUIZ #4

M	12 Oct	Nekton: Composition, Morphology, Populations	pp. 159-171 “Ocean Drifters” <i>Roger Hanlon and Edith Widder TED talks</i> <i>MBARI No such thing as jellyfish</i>
Tu	13 Oct	Discussion of “American Catch” * <i>(Essay assignment due)</i>	
W	14 Oct	Marine Mammals: Organisms and Adaptations	pp. 171-179, 492-494 Film: “Science of Whales” <i>Reading TBA</i> <i>Peter Tyack TED talk</i> <i>Changing Seas: Humpback Whale Song</i>
F	16 Oct	Marine Mammal Acoustics	

(First draft of individual paper due)

QUIZ #5

M	19 Oct	<i>Guest lecture: Dr. Dan Madigan, University of Windsor</i> "Apex predator ecology in changing oceans"
Tu	20 Oct	Class discussion: Expert groups discuss papers*
W	21 Oct	

Deep Sea Environments

F	23 Oct	Deep Sea Community Ecology: <i>(Final draft of individual paper due)</i>	pp. 201-210, 414-433
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QUIZ #6

M	26 Oct	<i>Guest Lecture: Dr. Kate Buckman, Dartmouth</i> (Hydrothermal Vent Communities)	"The Blue Planet: The Deep"
Tu	27 Oct	Class discussion: Mixed groups share papers *	Papers TBA
W	28 Oct	(Elliott Steele, EEES Graduate Program) <i>(Expert group paper outline due)</i>	

Tropical Marine Environments

F 30 Oct Coral Reefs: Environment and Community Interactions pp. 382-399
Film: "Blue Planet: Coral Seas"

QUIZ #7

M 2 Nov Coral Reef Disturbance pp. 399-404
Tu 3 Nov Class discussion: Mixed groups share papers*

Human Impacts on Marine Systems

W 4 Nov Fisheries Management pp. 471-492
*"Empty Oceans
Empty Nets"*
F 6 Nov *Guest Lecture:* Dr. Sonya Dyrhman, Columbia University pp. 521-526
Nancy Rabalais Ted Talk
Changing Seas movies

QUIZ #8

M 9 Nov *Guest Lecture:* Dr. Jennifer Hofmeister, CA Dept of Fish and Wildlife
Tu 10 Nov Fisheries groups meet to discuss presentations*
W 11 Nov Tale of Two Oil Spills: Exxon and BP pp. 514-521
"After the Spill"
F 13 Nov Climate Change: Ocean consequences of warming pp. 33-45, 250-254,
497-499, 526-529, 404-407

M 16 Nov *Group Presentation*
Tu 17 Nov Mercury Pollution in the Marine Environment pp. 509-511
W 18 Nov *Group Presentation*
(Fisheries recommendations due)