OEB 60: Fundamentals of Marine Biology

Department of Organismic and Evolutionary Biology
Harvard College
Spring 2024

Course Meetings
Tues-Thurs 12:00-1:15pm EST
Location: Biological Laboratory 1080
Course website: https://canvas.harvard.edu/courses/129874

Head Instructor
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COURSE DESCRIPTION

This course will explore the fundamentals of marine biology. In doing so, you will learn about the complex lifestyles of organisms whose home spans three quarters of our planet. We will take a process-driven approach, focusing first on the fundamentals: the interrelated processes of marine physiology, ecology, and evolution. What biological processes help organisms succeed in the marine environment? How do species traits vary throughout the different environments in the world's oceans? How do gradual and rapid changes in the ocean environment alter the "rules of life" for marine species? As we build our understanding of these fundamentals throughout the course, we will use them as lenses to view, disentangle, and understand larger patterns in the oceans. In particular, we will focus on the diversity and distributions of biological functions, patterns of biodiversity, and the growing threats to marine life. Learning will be assessed via a first-third exam, a short paper, and a final video and paper. Ultimately, students will come away with a new understanding of the unique challenges and incredible opportunities that arise from life in saltwater.

COURSE MATERIALS

Textbook and Readings
We will use a textbook called Marine Biology: Function, Biodiversity, Ecology by Jeffrey S. Levinton. This book is in its sixth edition, though you are welcome to buy the third, fourth, or fifth editions to reduce the cost. The older editions are less expensive (e.g., less than $10 online). There are multiple sites online where you can purchase or rent the text. For each reading, I will list the pages for all versions of the textbook on a message board on the course Canvas website. I will also assign some additional papers/readings that can be downloaded as pdfs from the course website.

EXPECTATIONS AND POLICIES

Attendance and Basic Expectations
I expect that you will attend all course sessions barring extenuating circumstances for which I grant excused absences. One extenuating circumstance is when you are sick, whether it is due to COVID-19 or something else. **Please stay home if you are sick to protect the rest of the community.** When this happens, please send an email to me and your TF. While we do not have a hybrid option, the TFs and I will do our best to make available as much course material as possible so that you can keep up with the course as you are able. Please also read the Support Statement below. You will also be expected to log in to Canvas throughout the semester to interact with your peers and with me. This work can be done on your own schedule.

Support Statement
Caring for ourselves and others is constant and sometimes unpredictable. The supportive roles we play have perhaps never been more acute than in recent years. I will excuse absences in cases where supporting yourself or others is paramount to attending class. If you are going to miss an entire class, please notify me and your TF.

Diversity and Inclusion
In this class we will embrace all forms of diversity and reject any form of hostility, discrimination, and bullying. We will strive to create a learning environment that supports a diversity of thoughts, perspectives, and experiences, and honors your identities, including race, gender, class, sexuality, ability, etc. Please don't hesitate to speak with me if you feel like your performance in the class is being impacted by your experiences outside of class. Your classmates and instructors (like many people) are still in the process of learning about diverse perspectives and identities. If something was said in class, by anyone, that made you feel uncomfortable, please talk to me about it. As a participant in course discussions, you should always strive to honor the diversity of your classmates (e.g., use appropriate pronouns and names, allow all voices to be heard). Credit: Dr. Rowan Martindale.

Accessibility
My goal is to make this course accessible and welcoming for all students, including students with disabilities that may impact learning in this class. Harvard is committed to providing an accessible academic community. The Accessible Education Office (AEO) partners with FAS students with visible and invisible disabilities to identify barriers and implement plans for access. Through collaboration with the campus community, we foster an environment of equity and inclusion. In addition to reaching out to AEO, please reach out to me directly at any time if you feel your needs are not being met.

Academic Integrity/Honesty
The Harvard College Honor Code states: "Members of the Harvard College community commit themselves to producing academic work of integrity – that is, work that adheres to the scholarly and intellectual standards of accurate attribution of sources, appropriate collection and use of data, and transparent acknowledgement of the contribution of others to our ideas, discoveries, interpretations, and conclusions. Cheating on exams or problem sets, plagiarizing or misrepresenting the ideas or language of someone else as one's own, falsifying data, or any other instance of academic

dishonesty violates the standards of our community, as well as the standards of the wider world of learning and affairs."

GETTING HELP

Post questions to Canvas
Please post course questions to the "Course Questions and Help" discussion on the course Canvas website. These questions will be open for all class members to respond and a great place to get a quick answer (and you may ask a question had by others).

Emailed questions
Your TFs and I will strive to answer all e-mails within 24 hours of receipt during the week, Monday through Friday. If you send us an e-mail on the weekend (Saturday or Sunday), the earliest you should expect a reply is Monday, though you may receive a reply earlier if we are online during the weekend.

Office Hours
I (Aaron) will hold offices hours upon request in person or via Zoom. My office hours are an appropriate time to ask questions about the course, as well as related questions beyond the scope of the class, such as advice on senior theses, graduate school, and careers in marine biology. TF office hours are also available upon request and at a time/format determined by the TF.

COURSE FORMAT

Lecture
Marine biology is a content-driven discipline. Therefore, I will give short to medium-length lectures (20-30 minutes) to convey important content and build the breadth of our collective understanding of the topic.

Discussions
We will have frequent discussions related to the day's topic as a full group and in smaller groups to deepen our understanding and identify questions.

Activities
We will engage in collaborative activities on a weekly basis that will apply concepts from lectures, readings, and discussions. Examples include game theory simulations, debates, discussions with practitioners, written reflection, and the course projects/assessments of learning. These activities will be a mix of working in small groups with your quiz group or TF cohort, working across cohorts and the whole class, conducting homework assignments, and reporting out in class and via Canvas.

Course website on Canvas
You will use the course website constantly throughout the semester. For example, you will post on discussion boards (e.g., content questions, course questions, responding to your peers, having discussions of big topics), upload assignments, work together on projects, download course content, take surveys, and more.

ASSESSMENTS OF LEARNING & GRADING

20%	Participation
20%	Weekly group quiz
20%	First-third exam
20%	Op-Ed Project
20%	Video and Paper Project (Final)

Participation
You will be expected to participate in several ways, allowing for the fact that we each have different levels of comfort in speaking up in front of an entire class. Opportunities to participate orally include classroom-wide discussions and conversations in smaller groups during class. You will have several opportunities to

participate with written text on the course website. These opportunities will include conversations on discussion boards, reviewing your peers' work, and posting your own work. Collectively, all these forms of participation will contribute to your grade in this area.

Weekly Quiz
We will have a group quiz during the last 10-15 minutes of class on ten Thursdays over the course of the semester (see below for the schedule). We will establish groups of 4-5 students at the beginning of semester and you will stay with this group and work on these quizzes together throughout the semester. The quizzes are open book and cover material from lecture as well as the readings assigned over the past week. These quizzes are intended to assess how well you're gaining information and engaging with course content, they will also allow you to connect with peers. You will list your group name and the members present on each week's quiz. Each student is allowed up to one missed quiz for excused absences during the semester, though you must email me and your TF. We will make opportunities to make up missed quizzes within reason throughout the semester.

First-Third Exam
You will complete an exam at the end of the fifth week of the course (i.e., one third of the way through the semester). The exam will include multiple choice and short answer questions and will cover the material presented up to that point. The material in this "first-third" exam will focus on the basics of marine biology as they relate to physiology, ecology, and evolution. The goal of this exam is to ensure that the core content and general concepts of these three areas have been attained. The exam will take place during our normal course meeting time, and you will have the entire course period to complete the exam.

Op-Ed Project
Each student will write an op-ed that is 2 pages single-spaced. You will select a marine biology topic and discuss its implications across physiology, ecology, and evolution. For example, students may select buoyancy regulation, then discuss the biology and physics of how positive buoyancy is achieved (physiology), how it allows some organisms to maximize sunlight and avoid predation (ecology), and how it affects dispersal of offspring and the maintenance of meta-populations and species over long time periods (evolution). The "twist" on a traditional paper that will make it a blog or op-ed is that the piece should be written in clear language so that a broad readership can understand it. The piece should also include connections to personal experiences (you can write yourself into the piece) or to society broadly. The pieces will be workshopped within your quiz group to improve the text and a revised version will be submitted later in the semester. I will provide a rubric to aid you in writing the piece.

Film and Paper Project (Final)
The course will culminate with a final project in which each of you will be asked to create a short film and an accompanying written document. You will make a ninety-second film using your choice of a combination of audio, closed captioning, and visuals, thinking of the public as your audience. In the film, you will make links between fundamental processes and the larger patterns in the oceans (you will come to understand what this means). Think social media-style. You are encouraged to include props, drawings, art, sketches, etc. and you can also use written text (written during filming or prior to). Be creative! I will not expect mastery of videography—the video footage may be taken with your phone, computer, or another small camera. New this year, we are collaborating with the Bok Center, and you will spend a class session at their production space working on and recording a draft of your film. A writing assignment will accompany the film. Your choice of a topic and the project details will be discussed during the semester. I will provide a rubric for both the film and written document.

COURSE SCHEDULE

Nearly every class will include lecture, discussion, activities, and assignments (reading, etc. outside of class) that relate to the topic(s) of the day. Reading assignments (textbook and papers) will be provided at least one week in advance of each class. The specific topic of each week is subject to change, but the general framework will remain the same.

Tues. January 23rd

- Course & instructor introduction, schedule, values affirmation, ice breakers

Thurs. January 25th

- History of the oceans (Guest: I-Ting Huang, Harvard OEB/Course TF)

Tues. January 30th

- Environmental conditions of the marine environment

Thurs. February 1st

- Marine productivity and phytoplankton diversity
- Weekly Group Quiz #1

Tues. February 6th

- Marine food webs

Thurs. February 8th

- Oceanic carbon cycle
- Weekly Group Quiz #2

Tues. February 13th

- Climate change and its impact on the marine environment

Thurs. February 15th

- Reproduction, life histories, and dispersal
- Weekly Group Quiz #3

Tues. February 20th

- Dispersal debate

Thurs, February 22nd

- **First-Third Exam**

Tues. February 27th

- Marine metazoan phyla (Guest: Arianna Lord, Harvard OEB)

Thurs. February 29th

- Fishes (Guest: Connor White, Harvard OEB)
- Weekly Group Quiz #4 (take home/after class)

Tues. March 5th

- Fisheries oceanography (Guest: Dr. Noelle Bowlin, National Oceanographic and Atmospheric Administration)

Thurs. March 7th

- Biodiversity and biogeography
- Biodiversity data interpretation and discussion
- Weekly Group Quiz #5

Tues. March 12th

- NO CLASS, Spring Break

Thurs. March 14th

- NO CLASS, Spring Break

Tues. March 19th

- Whale diversity and ecology (Guest: Dr. Alyson Fleming, University of Wisconsin)

Thurs. March 21st

- Marine Conservation
- Weekly Group Quiz #6

Tues. March 26th

- Fisheries Management (Guest: Dr. Daniel Viana, World Wildlife Fund US)
- Marine Conservation
- **DUE: Draft Blog or Op-Ed**

Thurs. March 28th

- Ecosystems: Estuaries
- Weekly Group Quiz #7

Tues. April 2nd

- Ecosystems: Rocky Intertidal
- Ecosystems: Mangrove Forests

Thurs. April 4th

- Blog Post or Op-Ed peer writing workshop
- **DUE: Comments on peers' draft Blog or Op-Ed**
- Weekly Group Quiz #8

Tues. April 9th

- Guest: Arianna Lord (Bok Center, Harvard): Final film project tutorial
- Ecosystems: Deep Sea / Microbes

Thurs. April 11th:

- Ecosystems: Coral reefs Part 1
- **DUE: Revised Blog Post or Op-Ed**
- Weekly Group Quiz #9

Tues. April 16th

- Ecosystems: Coral reefs Part 2
- Bok Center Group #1

Thurs. April 18th

- Marine Restoration
- Bok Center Group #2
- Weekly Group Quiz #10

Tues. April 23rd

- ARMS Restore Madagascar
- Bok Center Group #3

Tues. April 30th

- **DUE: Ninety-Second Final Film (by midnight EST)**

Weds. May 1st

- 12:00-2:00pm: Watch final films

Fri. May 3rd

- **DUE: Final Paper (by midnight)**