

## CAS BI 260 – Marine Biology Course Syllabus - Spring 2023

**Instructor:** Dr. Colleen Bove (she/her)

**E-mail:** bovec@bu.edu

**Lectures:** Monday, Wednesday, Friday 10:10am-11am; **LSE B01**

**Open Hours:** Mondays 11:15am-12:15pm, Wednesdays 1:00pm-2:00pm, and by appointment;  
**BRB 217**

**TF:** Lili Vizer (she/her)

**Discussion Sections:** Mon 2:30-3:20pm (**B1**); Thu 3:35-4:25pm (**C1**); Tue 3:35-4:25pm (**C3**);  
Thu 11:15am-12:05pm (**E1**)

**Email:** lvizer@bu.edu

**Open Hours:** Wednesdays 3:30pm-4:30pm; BRB515

**TF:** Colin Welge (he/him/his)

**Discussion Sections:** Tue 11:15am-12:05pm (**C2**); Wed 4:40-5:30pm (**B2**); Fri 9:05-9:55am  
(**F1**)

**Email:** cwelge@bu.edu

**Open Hours:** Tuesdays 1pm-2pm (SCI 301D)

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### OBJECTIVES

The principal objective of this course is to provide students with an introduction to marine life and the ocean environment. It is a great course for anybody with an interest in the ocean who has had Biology I (BI 107). This course is the prerequisite course for the BUMP Marine Semester, and a required course for Marine Science concentrators. The course begins by covering the basics of physical and chemical oceanography. This provides the context within which the evolution, behavior, ecology and conservation of marine organisms are considered. The course is aimed at sophomores and juniors in Biology and Marine Science, as well as other students interested in the relationship that humans have with the sea.

#### Lecture

There are three lectures each week on Monday, Wednesday, and Friday from 10:10 to 11:00 AM that will be held in **LSE B01**. The schedule for the lectures and lecture reading assignments is attached to this document (subject to change). All scheduled exams will also take place during the lecture period as indicated on the syllabus timeline below.

#### Discussion

There are seven discussions each week that are not interchangeable; you must attend your assigned section. Schedules for the discussions and discussion reading assignments are attached to this document and can be found on the discussion syllabus (subject to change).

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### Diversity Statement:

In this class, we are seriously committed to supporting diversity and inclusion among all classroom community members. We proactively strive to construct a safe and inclusive environment by respecting each other's dignity and privacy. We treat one another fairly and honour each member's experiences, beliefs, perspectives, abilities, and backgrounds. Our collective group is stronger because we strive to bring together people of all races, religion, language, immigration status, sexual orientation, gender identification, ability status, socio-economic status, and national identity. Bullying, hateful ideas, violent language, belittling, racial slurs, and other disrespectful or "othering" language or behaviour will not be tolerated in the

classroom or online. Our class provides a safe space for free inquiry and open exchange of ideas. Therefore, though we might feel strongly about a topic, we maintain respect for each other's diversity. We act and communicate respectfully toward one another, both directly and indirectly, both inside and outside the classroom. All members contribute to building a caring, inclusive learning environment that promotes productive participation and sharing, and engenders growth among us all. As a classroom community, we share these values. **If you ever have any concerns about the discussion or lecture climate, please reach out to an instructor (TF or lecturer).**

### Land Acknowledgment Statement:

We acknowledge that the territory on which Boston University stands is that of The Wampanoag and The Massachusetts People. Our classroom and BU's campus are places to honour and respect the history and continued efforts of the Native and Indigenous community leaders which make up Eastern Massachusetts and the surrounding region. This statement is one small step in acknowledging the history that brought us to reside on the land, and to help us seek understanding of our place within that history. Ownership of land is itself a colonial concept; many tribes had seasonal relationships with the land we currently inhabit. Today, Boston is still home to indigenous peoples, including the Mashpee Wampanoag and Wampanoag Tribe of Gay Head (Aquinnah).

## COURSE POLICIES

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### Disclaimer

Marine Biology is a dynamic and exciting field. Sometimes, there will be real-time opportunities for us to participate or investigate a topic, out-of-order. If those opportunities arise, the syllabus and dates may shift. As such, **please note that exams and/or assignments may shift**, so that you won't be caught off-guard. If this occurs, I will give you as much advance notice as possible, and will update the syllabus on Blackboard. Please plan accordingly.

### Required reading

Castro and Huber (2018) Marine Biology. Eleventh Edition. McGraw Hill. (earlier editions of the textbook are acceptable). [highered.mcgraw-hill.com/sites/0073524204](http://highered.mcgraw-hill.com/sites/0073524204) Hardcover, looseleaf, or ebooks are available for purchase (new or used) or rental through the bookstore or at various sites online. **This text is recommended, as it will supplement the lectures.**

### Grading

#### Lecture series (Scientific Inquiry HUB)

There are 37 lectures and 4 exams. Exams will draw on lecture and discussion material and associated readings. Exams will be graded based on clarity, conciseness, and correctness of answers. Exams will account for 70% of the final grade (E1 = 10%, E2 = 15%, E3 = 25%, E4 = 20%).

#### Discussion series (Research and Information Literacy HUB)

There are 10 graded discussions and the "Stub-to-Hub" Wikipedia assignment. The discussions will be graded based on figure assignments, activities, and thoughtful participation (**see Discussion syllabus for more details**). Taken together, the discussions will account for 30% of the final grade.

Item	Course Portion	% Course Grade
Exam 1	Lecture	10%
Exam 2	Lecture	15%
Exam 3	Lecture	25%
Exam 4	Lecture	20%
Figure Assignment (10 total)	Discussion	9%
Discussion Participation (10 total)	Discussion	9%
Wiki Assignment	Discussion	12%
<b>TOTAL</b>		<b>100%</b>

**Attendance**

Non-attendance is not penalized directly. However, in the past, most students have found the lectures and discussions to be helpful, and it is hard to participate in a discussion if you are not there. Hearing professors and your peers present and discuss ideas will give you a broader view of marine biology than can be gained from books alone. Exams are heavily lecture-based, so your attendance is strongly encouraged.

**Recording of lecture sessions**

Live lectures will be recorded via Echo360, for the pedagogical benefit of the entire class; you will be able to review content at your own pace, as many times as needed. Recorded sessions will be made available to registered students **ONLY** via their password-protected Blackboard account. Students may not share these recordings with anyone not registered in the course and may not repost them in a public platform. Students have the right to opt-out of being part of the class recording. Please contact me to discuss options for participating if you wish to opt out of recordings.

**Make-ups & Late work**

There will be no opportunities for make-up exams or assignments that do not fall within a valid university excuse. Please reach out to Dr. Bove and your TF as soon as you know you may be missing something for the course so we can discuss options. It is your responsibility to notify us if you need to make up an assignment or exam. If you have a health-related hardship that causes you to miss an exam, you will be given a 1-time option to schedule an alternative exam. If you have questions regarding the grading of exams, then you must resolve the issue within one week. Please email Dr. Bove and your TF with a written explanation for why you believe your answer was correct, and we will consider your petition.

**Workload**

This is a 4-credit course; *you should anticipate spending 8-12 hours per week outside of class time.*

**Prerequisites**

CAS BI 107 or consent of instructor.

**HUB-based Learning Objectives**

This course will satisfy three HUB units, as articulated below:

**1. Scientific Inquiry I**

Students learn the major concepts of marine biology, geology, ocean science, ecology, evolution, speciation, and behaviors and use these concepts to evaluate and read about experiments in the primary literature to analyze the natural world, in a marine and ocean context.

**2. Research and Information Literacy**

Throughout the semester, students' progress through the scientific process and learn how to appropriately find, use, and cite scientific references. They are also introduced to public databases of biological information. This occurs through the Discussion section associated with the lecture portion of this course.

**3. Critical Thinking**

Students are guided through the process of finding and critically evaluating peer-reviewed scientific literature each week, in a TF-guided discussion section.

Throughout the semester, these modes of thought are reinforced through continued exemplification in the lectures, which describe milestone experiments in biology, and conflicts that existed at the time and were subsequently resolved. Exams are challenging and are not multiple-choice; asking students to use their critical thinking skills to make connections across

topics in real-time on an exam. Students are also asked to create and interpret data, graphs, and infographics, as well as design and evaluate experimental procedures.

**Academic Conduct**

It is each student's responsibility to know and understand the provisions of the Academic Conduct Code in the College of Arts and Sciences. The Code is available online at <http://www.cs.bu.edu/ugradprogram/conduct.html>. Cases of suspected misconduct will be referred to the Dean of the College. If the Dean's office comes to the conclusion that cheating or plagiarism has occurred, a grade of zero will be awarded for the assignment in question.

**LECTURE SCHEDULE**

<b>Date</b>	<b>Topic</b>	<b>Reading</b>
<b>PART 1</b>	<b>PHYSICAL OCEANOGRAPHY, CHEMICAL OCEANOGRAPHY &amp; MARINE ECOSYSTEMS</b>	
Friday January 20	Course syllabus; Introduction to Marine Biology	Chapter 1. The Science of Marine Biology
Monday January 23rd	Formation of the Oceans	Chapter 2. The Sea Floor
Wednesday January 25th	Atmosphere and Ocean	Chapter 3.1/3.2 The Waters of the Ocean/Ocean Circulation
Friday January 27th	Waves and Tides	Chapter 3.3 Waves and Tides
Monday January 30th	Intertidal: soft-bottomed and rocky bottomed	Chapter 11. Between the Tides
Wednesday February 1st	Subtidal: soft-bottomed (seagrass bed) and rocky-bottomed (kelp forest)	Chapter 13. Life on the continental shelf.
Friday February 3rd	Subtidal: coral reefs	Chapter 14. Coral reefs
Monday February 6th	Guest Lecture: Dr. Shelby Ziegler (Estuaries: mudflats, marshes and mangroves)	Chapter 12. Estuaries: where rivers meet the sea
Wednesday February 8th	Julia Mendez, Guest Lecture - BUMP	
Friday February 10th	<b>Exam 1 - 10%</b>	Covers lectures & discussion through Feb 8, and all associated readings
Monday February 13th	Deep Sea	Chapter 16. The Ocean Depths
Wednesday February 15th	Epipelagic	Chapter 15. Life Near the Surface
Friday February 17th	Phylogeny and Macroevolution	Chapter 4. Fundamentals of Biology
<b>PART 2</b>	<b>MARINE BIODIVERSITY: KEY INNOVATIONS &amp; ADAPTATIONS</b>	
Monday February 20th	President's Day Holiday	NO CLASS
Tuesday February 21st	Biodiversity and Biogeography	Chapter 4.5 Diversity of Life in the Sea
Wednesday February 22nd	Microbial World	Chapter 5. The Microbial World
Friday February 24th	Guest Lecture: Dr. Alexa Sterling (Harmful Algal Blooms)	
Monday February 27th	Multicellular Primary Producers	Chapter 6. Multicellular Primary Producers
Wednesday March 1st	Lecture Catch Up Day	
Friday March 3rd	<b>Exam 2 - 15%</b>	Covers lectures & discussion through March 1, and all associated readings
<b>SPRING BREAK</b>		
Monday March 13th	Invertebrates 1: Poriferans, Cnidarians, Ctenophores	Chapter 7.1/7.2/7.3 Marine Animals Without a Backbone
Wednesday March 15th	Invertebrates 2: Ecdysozoans (focusing on Crustaceans)	Chapter 7.1/7.2/7.3 Marine Animals Without a Backbone

Friday March 17th	Invertebrates 3: Lophotrochozoans (focusing on Molluscs)	Chapter 7.5 Molluscs
Monday March 20th	Invertebrates 4: Deuterostomes (focusing on Echinoderms)	Chapter 7.8 Echinoderms
Wednesday March 22nd	Vertebrates 1: Cartilaginous fishes (including hagfishes & lampreys)	Chapter 8. Marine Fishes
Friday March 24th	Vertebrates 2: Ray-finned fishes	Chapter 8. Marine Fishes
Monday March 27th	Vertebrates 3: Lobe-finned fishes & Tetrapods	Chapter 9. Marine Reptiles, Birds and Mammals
Wednesday March 29th	Lecture Catch-Up Day	
Friday March 31st	<b>Exam 3 (25%)</b>	Covers lectures & discussion through March 29, and all associated readings
<b>PART 3</b>	<b>MARINE ECOLOGY, EVOLUTION &amp; CONSERVATION BIOLOGY</b>	
Monday April 3rd	Marine Reptiles and Birds, Mammals	Chapter 10. An Introduction to Marine Ecology
Wednesday April 5th	Guest Lecture: Dr. Jonathan Cowart (Marine Mammals)	
Friday April 7th	Careers and opportunities in Marine Science	TBD
Monday April 10th	Fish, Fisheries, and Food part 1	Chapter 18. The Impact of Humans on the Marine Environment
Wednesday April 12th	Fish, Fisheries, and Food part II	Chapter 18. The Impact of Humans on the Marine Environment
Friday April 14th	Marine Conservation	Chapter 18. The Impact of Humans on the Marine Environment
Monday, April 17th	Patriots Day	NO CLASS
Wednesday April 19th	Climate Change, Global Warming, and Acidification part 1	Chapter 10. Special report: our changing planet
Friday April 21st	Climate Change, Global Warming, and Acidification part 2	Chapter 10. Special report: our changing planet
Monday April 24th	Hot Topics in Marine Biology part 1	
Wednesday, April 26th	Hot Topics in Marine Biology part 2	
Friday April 28th	"Your Choice" Lecture	
Monday May 1st	Lecture Catch-up Day / Exam Review	
Wednesday May 3rd	<b>Exam 4 (20%)</b>	Covers lectures & discussion through May 1, and all associated readings

**DISCUSSION SCHEDULE**

All discussion papers can be found on the course Blackboard page in PDF format but can also be accessed through BU's online library resources (<https://www.bu.edu/library>).

<b>Discussion &amp; Date</b>	<b>Topic &amp; Reading</b>	<b>Wiki Assignments</b>
Week 1: Jan 23-27	<b>Scientific Method and Strong Inference</b> Platt (1964) Strong Inference. <i>Science</i> 146: 347-353	
Week 2: Jan 30-Feb 3	<b>Dynamical Oceanography and Ecosystem Ecology</b> Chavez et al. (2003) From anchovies to sardines and back: multidecadal change in the Pacific Ocean. <i>Science</i> 299: 217-221	Introduction, Create Accounts, Organism Assignments
Week 3: Feb 6-10	<b>Marine Ecosystem Dynamics</b> Connell (1961) The influence of interspecific competition and other factors on the distribution of the barnacle <i>Chthamalus stellatus</i> . <i>Ecology</i> 42: 710-723	Getting Started & Bibliography
Week 4: Feb 13-17	<b>Biodiversity</b> Benkwitt et al. (2020) Biodiversity increases ecosystem functions despite multiple stressors on coral reefs. <i>Nat Ecol Evol</i> 4, 919–926	Start Drafting Contributions
<i>Feb 20-24</i>	<i>NO DISCUSSION</i>	
Week 5: Feb 27-Mar 3	<b>Macroevolution</b> Sallan et al. (2018) The nearshore cradle of early vertebrate diversification. <i>Science</i> 362, 460-464	Continue Writing & Begin to Add to Wiki
<i>Mar 6-10</i>	<i>NO DISCUSSION</i>	
Week 6: Mar 13-17	<b>Phylogeny and Biodiversity</b> Knowlton N & Weigt LA (1998) New dates and new rates for divergence across the Isthmus of Panama. <i>PRSB</i> 265: 2257-2263	Continue Improving Article
Week 7: Mar 20-24	<b>Nutrient Limitation and Primary Productivity</b> Aranguren-Gassis et al. (2019) Nitrogen limitation inhibits marine diatom adaptation to high temperatures. <i>Ecology Letters</i> , 22: 1860–1869	Reciprocal Editing
Week 8: Mar 27-31	<b>Cooperation and Conflict</b> Wong et al. (2007) The threat of punishment enforces peaceful cooperation and stabilizes queues in a coral reef fish. <i>Proceedings of the Royal Society of London</i> , 274: 1093-1099	Polish Your Work
Week 9: Apr 3-7	<b>Natural Selection and Adaptation</b> Seeley (1986) Intense natural selection caused a rapid morphological transition in a living marine snail. <i>PNAS</i> 83: 6897.	Final Edits & Team Approval
Week 10: Apr 10-14	<b>Historical Ecology &amp; Trophic Ecology</b> McMahon et al. (2019) Divergent trophic responses of sympatric penguin species to historic anthropogenic exploitation and recent climate change. <i>PNAS</i> 116 (51) 25721-25727	Final "Submission" of Articles
<i>Apr 17-21</i>	<i>NO DISCUSSION</i>	
Week 11: Apr 24-28	<b>Marine Conservation</b> Camacho et al. (2020) Status of coral reefs in Antigua & Barbuda: using data to inform management. <i>PeerJ</i> 8:e9236	All finished!