ENVS 21B Oceanography

Class Meeting Details

Days & time: MTWR 1:50 – 3:50 PM (from Monday, June 5 through Thursday, July 6; no class on June 19 and July 4)
Format: This class will be held synchronously on zoom. Consistent class attendance is required.
Zoom link: https://brandeis.zoom.us/j/97202244127

Professor Contact Details

Professor Sally Warner
Email: sallywarner@brandeis.edu
Website: Brandeis faculty website
Name and pronouns: Please call me Professor Warner. I use she/her pronouns.
Office hours: You can sign up for a time slot to meet with me on zoom. Google Calendar will automatically send you the zoom link when you sign up. During the summer, my office hours will be on zoom only, there will not be an in-person option.
Meeting with me outside of my office hours: I will generally be available to chat after class, just stay on zoom after class ends. You can also contact me by email to schedule a virtual meeting outside of my office hours. I will respond as quickly as possible, at most within 24 hours on weekdays.

Course Description

The Earth is an ocean planet. Covering 71 percent of the Earth's surface and holding 97 percent of the Earth's water, the oceans are perhaps our planet's most distinctive feature. This course will address fundamental questions about the oceans, such as, how does the ocean influence Earth's climate and how is the ocean being affected by climate change? Why are there ocean currents, and how do they influence the patterns of life in the ocean? How are human actions changing the ocean today, and how does this impact people's lives?

To answer these questions, this course will introduce the complex interactions among geological, physical, chemical, and biological processes in the ocean. In-class group activities, discussions, debates, and a creative science communication project will emphasize quantitative problem solving, critical thinking, and science communication skills.

Learning Goals:
By the end of this course, you should be able to:

- Describe the factors that control the distributions of salinity, temperature, nutrients, carbon, and oxygen in the ocean, and how marine organisms and people can alter these patterns.
- Analyze and interpret real oceanographic data presented in numerical and graphical formats.

- Understand what drives the physical and chemical effects of climate change on the ocean, including sea level rise, ocean acidification, warming temperatures, and deoxygenation; and predict and evaluate the consequences of these changes for marine organisms and for people.
- Evaluate the scientific and societal merit of proposed human interventions to address and adapt to current ocean issues and changes.
- Present complicated scientific information in clear oral and written formats that are intended for nonscientific audiences.

Transferable Skills:

Transferrable skills are abilities that you will develop in this course that will be useful in future jobs in a wide variety of fields.

- **Science is a team activity:** Scientific research is not conducted by individuals working alone, but by collaborative teams composed of scientists, students, educators, and the public. In this class, you will collaborate with your peers to learn new material and tackle challenging tasks. I will emphasize and practice group problem solving during the lectures. Research on learning shows that this will both improve how much you learn as an individual as well as help you develop transferable skills for working as a member of a team.

- **Communicate science clearly:** Scientists need the ability to communicate scientific topics to audiences with a wide range of scientific knowledge. This includes everyone from their colleagues with extensive scientific expertise to kids and community members who may not have much scientific background. In this course, we will talk about the importance of science communication to help non-scientists understand and have concern for environmental issues impacting the ocean. Specifically, as a writing intensive course, you will get practice distilling complicated scientific topics into polished, interesting, and clearly-written work targeting non-scientific audiences.

- **Career paths to oceanography:** Throughout this class, you will learn about the careers, experiences, and scientific accomplishments of oceanographers who have made and are currently making important contributions to our knowledge about the oceans. We will specifically highlight the contributions of oceanographers from backgrounds currently underrepresented in the field. The goal of highlighting these oceanographers and their work is to expose you to the excitement of scientific discovery across a wide range of sub-disciplines within the field, and encourage you to identify with the range of backgrounds and paths that lead to careers in oceanography, science, and environmental policy.

Teaching/learning strategies

During the summer, this course will consist of 8 hours of in-class time per that will be devoted to lectures, group problem solving, and discussions of the course material. ***If you don't plan on coming to class or prefer in-class time to be devoted 100% to lectures, this likely is not the course for you.***

There are no midterms or a final exam in this course, however, to compensate for the lack of exams, you will be expected to do a significant amount of work, including readings before every class, quizzes on

assigned readings, prepare for and participate in debates, and a multi-part final project focused on oral and written communication of scientific topics for non-scientific audiences.

Credit Hours
Success in this four-credit course is based on the expectation that you will spend a minimum of 24 hours of study time per week in preparation for class (readings, assignments, project, etc.).

Writing Intensive
This is a writing intensive course. As such, it incorporates multiple assignments designed to assist students with developing the necessary skills for writing effectively within the discipline of oceanography and environmental studies. Students will engage different forms of writing —debate preparation and summaries, research paper, scientific fact sheet for non-scientific audiences, and reflections — and will have opportunities to workshop, revise, and receive feedback on their work throughout the semester.

Prerequisites
There are no prerequisites for this course.

Course Requirements

Success in this course depends on the following components, each of which is described in detail below:

- Multi-part final project
- Debate prep and performance
- Pre-lecture readings and reading quizzes
- Class attendance and participation

Ocean Issues Debate
We will hold three in-class debates organized around current societally-relevant ocean issues: (1) responding to coastal hazards, (2) lobsters vs right whales, and (3) ocean-based climate solutions. You will be part of a team that will orally argue the role of specific stakeholders. Each debate will have an associated set of readings and a writing assignment that you will complete in preparation for the debate.

The goal of these debates is to provide you with a chance to apply the knowledge you have gained in class to evaluate the scientific and societal merit of ocean-related policy decisions, and to practice communicating that knowledge in both written and oral formats.

The written preparation materials will be due at the start of class on the day of the debate and will not be accepted late. If you miss the oral portion of the debate, you will receive no credit unless you experienced a severe hardship that is out of your control. Documentation of this hardship will be required.

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Final project

A key goal of this course is that you learn about the issues affecting the ocean such as sea level rise, dead zones, ocean acidification, coral bleaching, etc. Not only do I want you to learn about these issues, but I want you to learn about the organizations and people who are working to solve these issues.

Therefore, your final project will involve researching an ocean issue and an organization that is focused on solving that issue. You will present your research and insights in a presentation on the final day of class and you will create a "fact sheet" which will be used to communicate your topic to non-scientific audiences.

There will be 7 components of the final project, which will be due throughout the semester:

(1) **Proposal** for the topic that you want to focus on
(2) **Research report** including a summary of a journal article about your topic
(3) **Draft of your fact sheet and peer feedback** about another student's fact sheet
(4) **Presentation** to the class about your topic and organization
(5) **Final fact sheet** that includes changes suggested by your peer reviewer
(6) **Writing reflection** for students to reflect on the process of going from proposal to research paper to fact sheet draft to finalized fact sheet
(7) **Feedback** about your classmates' presentations

Full details about this project will be given later in the semester.

The late submission policy will apply to *most* elements of the final project. The exception is part (3) draft of fact sheet and peer feedback and part (4) final presentation which **must** be turned in on the due date.

Readings and reading quizzes

Readings will be assigned to help you prepare for each class. I use the term "readings" loosely to mean things that you read (such as textbooks and articles), things that you watch (such as videos and movies), and things that you listen to (such as podcasts).

After completing each day's assigned readings, you will take a brief quiz to demonstrate your understanding of the material. Reading quizzes will be due at the start of each class and will not be accepted late. Each quiz will be graded on a score of 1-10. I will drop your lowest 2 quiz grades.

Class attendance and participation

You will earn credit for participation during the class meetings by participating in group problem solving and discussions. Because this in-class work is intended to be done with your classmates and because I truly believe students learn a lot by engaging in discussions with their peers, if you miss class, there will not be an opportunity to make up this missed work.

Late submission policy

Debate preps, reading quizzes, and all components of the final project will be due at the start of class. **Debate preps, reading quizzes, and parts 3 and 4 of the final project will not be accepted late because**

they are necessary for in-class work on the days that they are due. For all other submitted work, the following late policy applies:

Late submission policy: I have two categories for submitting work late:

(1) **"No excuse needed" category**: I will accept work **up to 3 days late**. You will lose 10% of the maximum value for each day that your work is late (i.e. 1-24 hours late loses 10%, 25-48 hours late loses 20%, and 49-72 hours late loses 30%, etc.). You do not need to give me an excuse to submit late work in this category. It's up to you to decide if it's worth it to lose the points for submitting a late assignment — sometimes the extra time will allow you to learn more and receive a better grade.

(2) **"Severe hardship" category**: If you cannot submit your assignment on time because you have experienced a severe hardship that's out of your control, please email me ***before the due date*** to discuss options for extensions.

Academic Integrity

Every member of the University community is expected to maintain the highest standards of academic integrity. A student shall not submit work that is falsified or is not the result of the student's own effort. Infringement of academic honesty by a student subjects that student to serious penalties, which may include failure on the assignment, failure in the course, suspension from the University or other sanctions (see section 20 of R&R). Please consult Brandeis University Rights and Responsibilities for all policies and procedures related to academic integrity. Students may be required to submit work to TurnItIn.com software to verify originality. A student who is in doubt regarding standards of academic honesty as they apply to a specific course or assignment should consult the faculty member responsible for that course or assignment before submitting the work. Allegations of alleged academic dishonesty will be forwarded to the Department of Student Rights and Community Standards. Citation and research assistance can be found at Brandeis Library Guides - Citing Sources (https://guides.library.brandeis.edu/c.php?g=301723).

Evaluation

Course Element	Grade %	Learning goals and skills that you will gain
Reading quizzes	10% I will drop your 2 lowest quiz scores.	- Develop the ability to think critically about scientific content in the assigned readings.
Ocean Issues Debate	25% For each of the 3 debates, written preparation will be worth 5%. Oral performance (as a group) for 2 debates will be worth 5% each.	- Learn about how ocean-related issues are impacting people who live and work in and near the ocean. - Work as a group to defend arguments in both oral and written formats.

Course Element	Grade %	Learning goals and skills that you will gain
Final Project	45% 1. 2% proposal 2. 5% research 3. 3% draft and peer feedback (2.5% each) 4. 15% final presentation 5. 15% final fact sheet 6. 3% written reflection on the writing process 7. 2% feedback on your classmates' presentations	- Dive deeply into a topic related to the health and well-being of the ocean. - Research organizations working to solve these problems. - Hone oral communication skills in a final presentation. - Hone writing skills for communicating with general audiences about science.
In-class participation	20%	- Improve your focus in class. - Ask questions and engage in discussions. - Engage in group problem-solving with your peers.

Course Materials

Reference materials and textbooks

We will use two free online textbooks in this course:

1. **Webb, Paul, 2021. *Introduction to Oceanography***. Download the textbook from: https://rwu.pressbooks.pub/webboceanography/.

2. **Segar, Douglas A. and Elaine Stamman Segar, 2018. *Introduction to Ocean Sciences*.** Fourth edition, Version 4.4. Download the textbook from: www.reefimages.com/oceansci.php.

Additional reading assignments will come from chapters in other reference books, scientific journal articles, newspaper articles, and videos. You may also wish to consult additional references. The following book is part of the course reserves at the library for this course:

> Pinet, Paul R., 2019. *Invitation to Oceanography*, Eighth Edition. Burlington: Jones & Bartlett Learning.

Essential Resources

Teaching Continuity

In general, all communication from me will be through Latte. Please regularly check the "Course Announcements" in Latte and watch your email for messages from me.

Since this course will be held synchronously, there are numerous events that may prevent you from attending class. Lectures will be recorded so if you miss class for one of the reasons discussed below, you will be able to watch what you missed. Email me to request a link to the recording.

- **Illness:** This is a remote course so if you are contagious but feeling well enough to attend class, please do so. If you are unable to attend class due to an illness, be sure to communicate with me as soon as possible via email. ("As soon as possible" means *before* class or within a day of class, not a week later.) If you become infected with a long-term illness, we can discuss on a case-by-case basis.

- **Athletic or religious events:** You must communicate this to me *before* the class that you will miss, so we can discuss ways that you can make up what you missed.

- **Campus closure due to inclement weather:** Since this course meets remotely, this will hopefully not be an issue in the summer. If it is, please watch for an email from me about the plan for that day's class.

- **Internet failure:** Please do your best to have a good internet connection for every class meeting. This means having a strong enough connection to turn your camera on and have discussions with your classmates. If you lose internet access, please communicate this to me as soon as possible, so we can discuss possibilities for making up the work that you missed.

Accommodations and Student Support

Brandeis seeks to create a learning environment that is welcoming and inclusive of all students, and I want to support you in your learning. If you think you may require disability accommodations, you will need to work with Student Accessibility Support (SAS) (781-736-3470 - access@brandeis.edu - brandeis.edu/accessibility). You can find helpful student FAQs and other resources on the SAS website, including guidance on how to know whether you might be eligible for support from SAS.

If you already have an accommodation letter from SAS, please provide me with a copy as soon as you can so that I can ensure effective implementation of accommodations for this class. In order to coordinate exam accommodations, ideally you should provide the accommodation letter at least 48 hours before an exam.

LATTE

LATTE is the Brandeis learning management system: http://latte.brandeis.edu. Login using your UNET ID and password.

Library

The Brandeis Library collections and staff offer resources and services to support Brandeis students, faculty and staff. These include workshops, consultations, collaboration, materials and instruction on emerging trends in technologies such as machine learning, emerging trends in research such as data visualization, and emerging trends in scholarship such as open access. Librarians at the Circulation Desk, Research Help Desk, Archives & Special Collections, Sound & Image Media Studios, MakerLab, AutomationLab, and Digital Scholarship Lab are available to help you.
https://www.brandeis.edu/library/about/index.html

Video Recording

Be aware that class sessions will be streamed live (via Zoom) and recorded for educational purposes. Recordings will be made available upon request. They will not be posted publicly.

Course Plan

Please note that this course plan is subject to change. **The course Latte page will contain finalized information about each day's topics, assigned readings, and other due dates.**

Class #	Date	Topics	Work due
1	Monday, June 5	Introduction and motivation for the course	
2	Tuesday, June 6	Plate tectonics and the seafloor	
3	Wednesday, June 7	Climate change and coastal hazards: Sea level rise	
4	Thursday, June 8	Climate change and coastal hazards: Ocean warming and hurricanes	
5	Monday, June 12	Salinity, temperature, density and stratification	
6	Tuesday, June 13	Deepwater formation and overturning circulation	
7	Wednesday, June 14	Debate #1: Preparing for coastal hazards	Debate #1 prep
8	Thursday, June 15	Coriolis effect and wind-driven circulation	Final project part 1: PROPOSAL
	Monday, June 19	NO CLASS | Juneteenth	
9	Tuesday, June 20	Phytoplankton and spring blooms	
10	Wednesday, June 21	Food webs and New England fisheries	
11	Thursday, June 22	Debate #2: Lobsters vs right whales	Debate #2 prep

Class #	Date	Topics	Work due
12	Monday, June 26	Ocean carbon cycle and the biological pump	Final project part 2: RESEARCH
13	Tuesday, June 27	Ocean acidification and coral bleaching	
14	Wednesday, June 28	Ocean deoxygenation and coastal hypoxia	
15	Thursday, June 29	Ocean-based climate solutions	Final project part 3: DRAFT OF FACT SHEET & PEER REVIEW
16	Monday, July 3	Debate #3: Ocean-based carbon dioxide removal	Debate #3 prep
	Tuesday, July 4	NO CLASS | 4th of July	
17	Wednesday, July 5	Waves & tides	
18	Thursday, July 6	Final presentations	- Final project part 4: FINAL PRESENTATION - Final project part 5: FINAL FACT SHEET - Final project part 6: WRITING REFLECTION - Final project part 7: FEEDBACK ON YOUR CLASSMATES' PRESENTATIONS