

GEOL 120: THE CHANGING OCEAN

FALL 2024



Course Information:

Instructor: Dr. Brittany Hupp
Contact Information: bhupp@gmu.edu
Office Hours: Mondays, 11 am to 12 pm or by
appointment, Exploratory Hall 3454
Class Hours: Mondays and Wednesdays,
3:00 – 4:15 pm
Class Location: Exploratory Hall, Room L111

Course Description

Our oceans are rapidly changing in response to human-induced and natural catalysts such as carbon emissions, overfishing, and habitat destruction. This course closely examines a handful of such changes to our global ocean. To understand these changes, students explore physical, chemical, geological, and biological processes at work in the ocean, how these processes are disturbed by external factors such as societal activity, and how humanity can mitigate the disturbances.

Class Text: *Essentials of Oceanography, 13th edition*, Authors: Alan Trujillo & Harold Thurman, ISBN: 013489152X / 9780134891521

The textbook will be supplemented with additional readings that help to cover dimensions (e.g., human influence) beyond the basic scientific principles related to each ocean issue. **Note:** *Older editions of this textbook are likely sufficiently up-to-date on most topics covered in this course and are probably cheaper to purchase than the newest edition.*

Prerequisites

None.

Student Learning Objectives

Upon successful completion of this course, students will be able to:

1. Describe key issues that are impacting the global ocean.
2. Identify controls and make predictions about changes in Earth's global energy budget.
3. Recall examples of how our understanding of ocean processes has changed through time with the introduction of new information.
4. Describe the coupled nature of the ocean-atmosphere system in dictating ocean circulation.
5. Predict the consequences and impact of human-induced chemical, physical, and biological perturbations to marine ecosystems.
6. Identify climate change impacts on our changing ocean (e.g., sea level rise, tropical cyclone intensity).
7. Demonstrate an understanding of how marine geological records provide insight into past climate change.

- Specify actions that can be taken by individuals and communities to lessen the negative impacts of human activity on the ocean system.

As a Mason Core Natural Science course, successful completion of this course will also require students to:

- Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding:
 - evolves based on new evidence
 - differs from personal and cultural beliefs
- Recognize the scope and limits of science.
- Recognize and articulate the relationship between the natural sciences and society and the application of science to societal challenges (e.g., health, conservation, sustainability, energy, natural disasters, etc.).
- Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information).

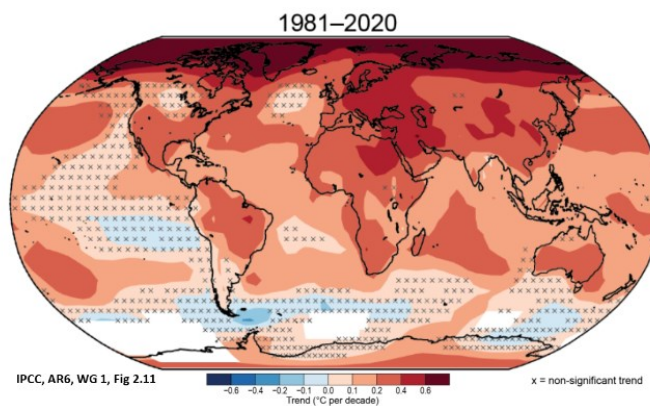
Course Structure

This course is divided into five themes. Each theme represents a major issue that is negatively impacting our global ocean and will be systematically addressed by answering these questions:

- What is the issue? What is the impact of this issue on human communities?
- What ocean processes cause this phenomenon to occur? What human activities cause this phenomenon to occur?
- What is the impact on marine ecosystems?
- What can we do to counteract these effects and prevent further negative consequences for the ocean and ourselves?

Through this lens, we will inherently learn about the physical, chemical, geological, and biological processes that are active in the global ocean as well as how we interact with this complex system. Specific themes to be addressed this semester include:

- Development of the Great Pacific Garbage Patch
- Ocean Acidification
- Impacts on Marine Ecosystems: Eutrophication, Overfishing, Coral Bleaching, and Destruction of Marine Habitats
- Sea Level Rise
- Climate Change & Our Changing Ocean: Past, Present, & Future



Grading

There will be two midterm exams each worth 15% of your final grade. The final exam is worth 20% of your total grade and will include comprehensive questions. There will also be weekly

reading quizzes to be completed outside of class time (11 in total, lowest grade dropped) which collectively account for 40% of your total grade. The remainder of the course grade (10%) will be earned through in-class participation. Your participation grade will be based on the completion of in-class lecture questions distributed through the Poll Everywhere app.

Assignment Type	%
Midterm 1	15
Midterm 2	15
Final Exam	20
Reading Quizzes	40
In-Class Participation	10

Final Grade Scale

A+ = 97 – 100%	B+ = 87 – 89%	C+ = 77 – 79%	D = 60 – 69%
A = 93 – 96%	B = 83 – 86%	C = 73 – 76%	F = 0 – 59%
A- = 90 – 92%	B- = 80 – 82%	C- = 70 – 72%	

Course Policies

Attendance: Attendance at all scheduled lecture sessions is required to achieve the requisite level of knowledge in this course.

Expectations for time spent outside of class: Please allot two hours per class meeting outside of class time to complete readings and reading quizzes and to study for exams.

Use of technology: Access to a working computer with a stable internet connection is required for course work done outside of class. During class, please be respectful of our time together and do not engage in activities that are unrelated to class. Cell phones may be used to answer Poll Everywhere participation questions, but should otherwise be muted and used for emergencies only.

Names and Pronouns: I will gladly honor your request to address you by your preferred name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes.

Late Policy: All assignments are due at their assigned due dates unless an alternative arrangement has been made. In general, each student is allowed one “freebie” extension of 3 days for reading quiz per semester. Beyond the freebie extension, late work will not be accepted. If there are circumstances that prevent you from turning in an assignment on time, please contact me before an assignment is late so that we may establish an alternative timeline.

Communication Plan: Email is the best way to get in touch with me. If you send me an email, I will respond within 2 business days. Please note, I do my best not to read or respond to emails past 6 pm. I am also reachable in-person before/after class and during office hours. If you would like to meet at an alternative time in person or via zoom, feel free to reach out and we can work together to find a different time to meet.

Course Schedule*** Note: I reserve the right to make changes to this syllabus as needed.

Class	Day of Week	Theme	Topic	Helpful Reading	
Aug. 26	M	Introduction	Welcome to the Water Planet	Ch. 1	
Aug. 28	W		Origins of the Oceans	Ch. 1	
Sept. 2	M		NO CLASS - Labor Day		
Sept. 4	W		Marine Provinces & Plate Tectonics	Ch. 2 & 3	
Sept. 9	M	Issue #1: The Great Pacific Garbage Patch	What is the Great Pacific Garbage Patch?		
Sept. 11	W		NO CLASS (No lecture, but lab sections will meet)		
Sept. 16	M		Earth's Energy Budget	Posted to BB	
Sept. 18	W		Properties of Water	Ch. 5	
Sept. 23	M		Atmospheric Circulation	Ch. 6	
Sept. 25	W		Surface Ocean Circulation	Ch. 6 & 7	
Sept. 30	M		Deep Ocean Circulation & GPGP Wrap-Up	Ch. 7	
Oct. 2	W	MIDTERM #1			
Oct. 7	M	Issue #2: Ocean Acidification	What is ocean acidification? Chemistry of Seawater	Ch. 5	
Oct. 9	W		Materials of the Seafloor	Ch. 4	
Oct. 14	M		NO CLASS - Fall Break		
Oct. 16	W		Carbon Cycling, OA Impacts on Ecosystems, & OA Wrap-Up		
Oct. 21	M	Issue #3: Impacts on Marine Ecosystems	Ocean Environments & Types of Marine Ecosystems	Ch. 12	
Oct. 23	W		Primary Productivity and Oceanic Dead Zones	Ch. 13	
Oct. 28	M		Marine Ecosystems I	Ch. 14	
Oct. 30	W		Marine Ecosystems II	Ch. 15	
Nov. 4	M		Balance in Marine Ecosystems: Overfishing & Invasive Species	Ch. 13	
Nov. 6	W		Habitat Destruction & Impacts on Marine Ecosystems Wrap-Up		
Nov. 11	M	MIDTERM #2			
Nov. 13	W	Issue #4: Sea Level Rise	What is sea level rise? Structure of Coastal Environments	Ch. 10	
Nov. 18	M		Waves & Tides	Ch. 8 & 9	
Nov. 20	W		Sea Level Rise: Causes & Future Changes		
Nov. 25	M	Issue #5: Climate Change & Our Changing Ocean: Past, Present, & Future	Evidence and Mechanisms of Climate Change	Ch. 16	
Nov. 27	W		NO CLASS- Thanksgiving Break		
Dec. 2	M		Paleoclimatology & Paleoceanography	Ch. 16	
Dec. 4	W		Modern Climate Change Impacts	Ch. 16	
Dec. 9	M		Future Projections & Harnessing the Power of the Seas		
Dec. 16	M		FINAL EXAM (1:30 to 4:15 pm)		

Mason Policy Guidelines

These university and class policies are important to understand:

Disability Accommodations

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit <http://ds.gmu.edu/> for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500.

Email: ods@gmu.edu | Phone: (703) 993-2474

Office of Disability Services: <http://ods.gmu.edu>

Academic Integrity

The integrity of the University community is affected by the individual choices made by each of us. Mason has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using the appropriate format for this class. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.

If only your name appears on an assignment, your professor has the right to expect that you have done the work yourself, fully and independently. Mason is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously, and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

Diversity and Inclusion

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.

Sexual Harassment, Sexual Misconduct, and Interpersonal Violence

Notice of mandatory reporting of sexual or interpersonal misconduct: As a faculty member, I am designated as a "Non-Confidential Employee," and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason's Title IX Coordinator by calling 703-993-8730 or emailing titleix@gmu.edu.

Privacy

Students must use their MasonLive email account to receive important University information, including messages related to this class. Please see <http://masonlive.gmu.edu> for more information.