



Course Information

Course Title: Physical Oceanography
Course Number: AOSC420/AOSC670/GEOL670
Term: Fall 2020
Credits: 3
Course Dates: From Aug. 31, 2020 – Dec. 16, 2020
Course Times: MW 3:15 – 4:30 PM

Professor: Jacob Wenegrat
Pronouns: he/him
Email: wenegrat@umd.edu
Office Hours: TBD
Zoom Link: TBD

Course Description

This course provides an overview of the field of physical oceanography. We will cover the major elements of physical oceanography, including a description of ocean water masses, circulation, and how the ocean influences other elements of the earth system. To do this we will discuss and use the major tools of oceanography: theory, numerical modeling, and observations.

Course Objectives

After successfully completing this course you will be able to:

- Describe the major patterns of ocean circulation, and how they affect the distribution of tracers (for example heat, salt, nutrients, carbon) through the world's oceans.
- Explain ocean circulation using the tools of physics.
- Analyze ocean observations and relate the data to ocean physics.
- Discuss some of the major current topics in the field of physical oceanography.

Course Resources

- Course Website: elms.umd.edu
- Books (optional):
 - Descriptive physical oceanography, Sixth Edition: An Introduction. Lynne D. Talley, George L. Pickard, William Emery and James H. Swift. ISBN-10:0750645520. Available at: <https://umaryland.on.worldcat.org/oclc/784140610>
 - Atmosphere, ocean, and climate dynamics. John Marshall and R. Alan Plumb. ISBN-10: 0125586914. Available online through: <https://umaryland.on.worldcat.org/oclc/662453156>

Course Structure

The twice-weekly lectures for this course will be held via Zoom. Recorded lectures will be made available through the course website, however note that these are intended to be a resource for reviewing material you may not have fully understood, or as a backup plan if you have to miss lectures. The best learning experience for this course will come from attending the lectures live, which gives you an opportunity to ask questions, and to participate in small-group activities, practice problems, and reading discussions. These activities will not be part of the recorded session.

I will also hold weekly office hours, at a time to be determined by class poll. I hope you will join these regularly, as a place to ask questions about the lectures, get help with homework, or to simply discuss any other aspects of physical oceanography that you would like to learn more about!

Course-Specific Policies

Classes during a global pandemic

Things are not normal. This semester we are all going to be doing our best under difficult circumstances, and we need to acknowledge that and approach our academic lives with understanding and patience (for ourselves and others). Some guiding principles:

- Please **communicate with me early and often** if you need accommodations. I have tried to design the course to remove obstacles and stress, but I need your feedback.
- Your **health and wellbeing, both mental and physical, is paramount**. Ask for what you need to be supported in this class, and I will do everything I can to make it happen.
- **Things are going to change** in ways that are hard to anticipate. I will be flexible and understanding with you and ask that you do the same for me.

My number one goal for this class is to communicate the beauty of how the simple tools of physics give us deep insight into the workings of our blue planet, and the wonder of how much is left to be discovered. This is a topic that brings me a lot of happiness, and I hope it will do the same for you.

Zoom policies

If it is possible for your situation, please leave your camera on during lectures. This will help us facilitate an active learning environment, give you a chance to get to know your fellow students, and will allow me to give more engaging lectures that better communicate the material. We will also do frequent 'breakout room' small-group discussions on Zoom, and for those having your video on will be particularly useful. However, I understand that there are many possible extenuating circumstances at play in our lives at the moment, such that it may not always be possible to have your video on. Cameos from kids, roommates, dogs and cats are all perfectly OK.

Names/Pronouns and Self-Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. I invite you, if you wish, to tell us how you want to be referred to both in terms of your name and your pronouns (he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow Terps.

Communication with Instructor:

If you have questions related to topics in lectures or homework, and you feel comfortable, please post them on the ELMS discussion board. This allows others (who likely have similar questions) to see the answer, or to provide their own input.

That being said, it is also completely fine to email me directly at wenegrat@umd.edu. Other routes for communication are attending the office hours, or emailing to setup a phone/zoom chat.

Activities, Learning Assessments, & Expectations for Students

- 1) 4 assignments due at approximately 4 week intervals. You may discuss the assignments with fellow students but you need to complete the assignment yourself. Students enrolled at the 670 level will have additional questions to complete. **50% of grade**
- 2) 3 quizzes will be spread throughout the semester. These will be take-home and open notes/textbook/internet, but must be completed individually with no discussion with others. Students enrolled at the 670 level may have additional questions on the quizzes. **30% of grade**
- 3) Journal article readings and discussions. Most weeks we will have an assigned reading of a recent journal article relevant to the course materials, which we will discuss in class on Wednesdays. Students at the 420 level will be graded on their participation in the class discussion of the papers. Students at the 670 level will be graded both on their participation, and on leading the discussion of 2 of the papers. **20% of grade**

Grades

Grades are calculated by the combined performance on assignments and assessments as specified above under *Activities, Learning Assessments, & Expectations for Students*. Your final grade is determined by your performance on the learning assessments in the course and is assigned individually (not curved). The precise division between the scores for different grades will be adjusted depending on how hard I think the assignments and quizzes ended up being (and so cannot be specified a priori).

However, the maximum possible cutoffs are (i.e. grading may get easier than this but not harder):

Maximum Grade Cutoffs									
+	97.00%	+	87.00%	+	77.00%	+	67.00%	+	
A	93.00%	B	83.00%	C	73.00%	D	63.00%	F	<60.0%
-	90.00%	-	80.00%	-	70.00%	-	60.00%	-	

Grades and assessment scores will be posted on the course ELMS page. If you would like to review any of your grades (including the exams), or have questions about how something was scored, please email me to schedule a time for us to meet 1-1.

Course Schedule

This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. In the event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

WEEK	MONDAY	WEDNESDAY	DUE DATES
1	8/31- Intro to class and a guided tour of the oceans	9/2 - Physical characteristics of the ocean	
2	9/7 - <i>No-class, Labor Day</i>	9/9 - Mass, heat, and salt budgets	
3	9/14 - Equations of motion	9/16 - Rotation	
4	9/21 - Geostrophic balance	9/23 - Hydrographic methods (then and now)	HW 1 due 9/25
5	9/28 - Ekman balance	9/30 - Ekman pumping/suction	
6	10/5 - Taylor-Proudman	10/7 - Wind-driven circulation	Quiz 1 due 10/7
7	10/12 - Western intensification	10/14 - Catch-up/Special topics	
8	10/19 - Abyssal circulation	10/21 - Abyssal circulation 2	HW 2 due 10/23
9	10/26 - Antarctic circumpolar current	10/28 - Ocean heat transport	
10	11/2 - The turbulent ocean	11/4 - Catch-up/Special topics	
11	11/9 - Surface gravity waves	11/11 - Surface gravity waves 2	Quiz 2 due 11/11
12	11/16 - Tides	11/18 - Estuaries	HW 3 due 11/20
13	11/23 - The tropics	11/25 - <i>No-class, Thanksgiving</i>	
14	11/30 - The tropics 2	12/2 - Ocean's role in climate & carbon	
15	12/7 - The changing ocean	12/9 - The future of physical oceanography	HW 4 due 12/11
16	12/14 - Catch-up/Special Topics	12/16 - <i>No-class, finals</i>	Quiz 3 due 12/16

Campus Policies

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct

- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please visit www.ugst.umd.edu/courserelatedpolicies.html for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.

Resources & Accommodations

Accessibility and Disability Services

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The [Accessibility & Disability Service \(ADS\)](#) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the semester begins or as soon as a disability becomes known. Any student who needs accommodations should contact me as soon as possible so that I have sufficient time to make arrangements.

For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at adsfrontdesk@umd.edu. Information about [sharing your accommodations with instructors, note taking assistance](#) and more is available from the [Counseling Center](#).

Student Resources and Services

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit [UMD's Student Academic Support Services website](#) to learn more about the wide range of campus resources available to you. As mentioned above this is a particularly difficult time, and I will do everything I can to make it possible for you to meet your learning goals in this class.

You should also know there are a wide range of resources to support you with whatever you might need ([UMD's Student Resources and Services website](#) may help). If you feel it would be helpful to have someone to talk to, visit [UMD's Counseling Center](#) or [one of the many other mental health resources on campus](#).

Basic Needs Security

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit [UMD's Division of Student Affairs website](#) for information about resources the campus offers you and let me know if I can help in any way.

Access to technology

Course lectures and homework will require a computer with webcam, and reliable internet access. Please let me know as soon as possible if you foresee any issues with your access to these.

Copyright Notice

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