

## ES 144 - INTRODUCTION TO OCEANOGRAPHY FALL 2016

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Lecture: MWF 2-3 pm in CAS/Stone Science Room B50

FINAL EXAM= Monday, 12/19/16, 12:30-2:30 pm

Required Text: Trujillo and Thurman – Essentials of Oceanography, 12th edition; available at BU bookstore.

**Class info, lectures, etc.:** [www.fulweilerlab.com](http://www.fulweilerlab.com) (go to courses and click on the ES 144 link)

*Password:* #BUOceans2016

**Course Overview** – Oceanography is a branch of Earth Sciences that encompasses a variety of topics from ocean currents and plate tectonics to chemical fluxes and ecosystem dynamics. Over 70% of the earth's surface is ocean - so learning about the oceans will help us to understand how the whole earth system functions. In addition, the oceans are not only one of the most important agents controlling global climate but they are also one of the chief sinks (and in some cases, sources) for many of the gases and chemical compounds about which mankind is worried (e.g., carbon dioxide and methane). As you might guess, an interdisciplinary approach is critical to understanding how the oceans function.

In this course we will examine all four major disciplines of oceanography including physical (e.g., waves, currents, tides, and the behavior of light and sound), geological (e.g., plate tectonics, weathering, coastal erosion), chemical (e.g., composition of seawater, interactions of seawater with the atmosphere), and biological (e.g. distribution and ecology of marine organisms). By the end of this course you will have a solid understanding of controls on oceanic circulation, the connection between the ocean and the atmosphere, the major chemical transport and reactions in the ocean, and the how organisms alter the ocean and vice versa. Finally, we will discuss the science behind marine law, policy, and management.

**Responsibilities** – It is your job to participate and communicate. I encourage you to ask questions during class – there are NO dumb questions. Do not wait for the end of the semester to express your feelings about any aspect of the course – I will enthusiastically listen to constructive comments and suggestions, and will respond where possible. Of course, I can only do this if I am aware of your questions, concerns, suggestions, etc. So please feel free to contact me outside of class. This does not just apply to course material – if you are interested in a particular subject and would like more information on current topics, something you saw on the news, read in the paper or if you are interested in careers in oceanography, becoming a marine science major, research opportunities at BU, etc.– I am happy to help and point you in the right direction.

**Exams and Course Grading** – You will have three exams during the semester plus a final exam. Exams 1, 2, and 3 are each worth 20% of your grade. The final exam is worth 40%. (Note all marine science majors are required to also sign up for the marine discussion and your grade will be calculated differently. We will go over these details in the first discussion). The exams will be based on what we discuss in class *and* on the readings, and will consist of various different types of questions including (but not limited to), multiple choice, True/False, fill-in-the-blank, and short answers. All exams, except the final, are non-cumulative and will be straightforward, yet challenging. By the end of the course I will expect you to be thinking more deeply than earlier in the semester, and thus the questions will be more involved and more integrative in nature as the course progresses. Your attendance is required at all lectures and, of course, exams. I do **not** give make-up exams, except for extremely compelling reasons discussed in advance or truly late-breaking family emergencies (and I need proof).

I will also give a quiz every day – don't worry about this. It will require no additional studying – just that you are in class and paying attention. And it will not hurt your grade –it can only help. For the quiz you can get a 0, 1, or 2. At the end of the semester (after ~38 quizzes) if your point total is equal to or greater than 70 your final grade will be increased by 2%, if your point total is between 40-69 your final grade will be increased by 1%, if your point total is equal to or less than 39 then your final grade will not change. In addition, during the semester two quizzes will be special bonus quizzes and you will be able to add up to 2 points to your final grade (i.e. if you get a 2 on each of the bonus quizzes – then and only then will 2 points be added to your final grade).

Finally, I stress the importance of your familiarity with, and adherence to, Boston University's *College of Arts and Sciences Academic Conduct Code*. It is the responsibility of every student to be aware of the Academic Conduct Code's contents and to abide by its provisions. The Academic Conduct Code can be found at [www.bu.edu/cas/students/undergrad-resources/code](http://www.bu.edu/cas/students/undergrad-resources/code). Cases of academic misconduct will be promptly referred to the Dean's Office.

**WWW Sites of Interest** - There are several Web sites that you may find interesting to check out. Several are from educational/research institutions, several are from research groups, and others are just sort of "miscellaneous oceanography". There are many more –these are just to get you started.

- The Oceanography Society (TOS): <http://www.tos.org/>
- Joint Ocean Global Flux Study (JGOFS): <http://www1.whoi.edu/jgofs.html>
- Ocean Drilling Program (ODP): <http://www.oceandrilling.org>
- Sea Education Association (SEA): <http://www.sea.edu>
- Women in Oceanography: <http://www.womenoceanographers.org/>
- Earth from Space: <http://www.earthfromspace.si.edu/>
- The American Society of Limnology and Oceanography: <http://www.aslo.org/>
- Coastal and Estuarine Research Federation: <http://www.erf.org/>
- The Intergovernmental Panel on Climate Change: <http://www.ipcc.ch/>
- Careers in Oceanography and marine sciences:  
<http://ocean.peterbrueggeman.com/career.html>
- El Nino (NOAA Page): <http://www.pmel.noaa.gov/tao/elnino/nino-home.html>
- The Naked Scientists: <http://www.thenakedscientists.com/>

This is our working syllabus – it will likely change.

	Date	Topic	Relevant Reading	
September	7	Introduction & Class Basics	NA	
	9	History of Ocean Exploration - from the pioneers to present	1	
	12	Origin of the solar system, the earth, and its oceans	1	
	14	Water, Water everywhere and not a drop to drink	5	
	16	Plate Tectonics 101 - Theory & Evidence	2	
	19	Plate Tectonics - Shape of the Ocean Basins	2	
	21	Plate Tectonics - Mid-Ocean Ridges, Subduction Zones, Volcanic Arcs	2	
	23	The stories marine sediments tell us	4	
	26	Atmospheric Circulation - Coriolis Who?	6	
	28	Exam I		
	30	Guest Lecture - Topic TBD	TBD	
October	3	Ocean Circulation I	7	
	5	Ocean Circulation II	7	
	7	Wave Basics	8	
	10	<i>Columbus Day - No Class</i>		
	11	Monday Schedule: Surfs up!	8	
	12	How the moon controls the ocean	9	
	14	Marine Ecology 101 - How do we classify Life?	12	
	17	Liebig and Redfield - Limiting Nutrients in the Ocean	13	
	19	The Grass of the Sea	13	
	21	Exam II		
	24	Global Ocean Productivity	13	
	26	The Sea is on Fire	TBD	
	28	Food Webs and Energy Transfer	13	
31	Special Topic: The Immortal Life of Jellyfish	S		
November	2	Tiny Water Column Dwellers	12	
	4	Invertebrates - from small worms to colossal squid	14, 15	
	7	Everything you need to know about fish	14,15	
	9	Marine Mammals and other Charismatic Megafauna	14,15	
	11	Whale Wars	S	
	14	Ocean Birds	S	
	16	Hot Vents and Cold Seeps	15,S	
	18	Do Sea Monsters Exist	S	
	21	Exam III		
	23	<i>Thanksgiving Recess (Gobble Gobble!) - No Class</i>		
	25			
	28	Coastal Habitats - Salt Marshes, Mangroves, & Coral Reefs	10	
	30	Human Impacts: Fishing Down the Food Chain	S	
	2	Human Impacts II: Pollution (w/ a focus on 2010 Gulf Horizon Oil Spill)	11,S	
December	4	Climate Change and the Ocean - Warming waters, rising seas	S	
	7	Marine Policy and Law: Guest Lecturer	S	
	9	The Future of Oceanography	S	
	12	Final Exam Review	all the things	