

ES 144 - INTRODUCTION TO OCEANOGRAPHY FALL 2018

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Lecture: MWF 2:30-3:20 pm in CAS 522

FINAL EXAM: Monday, 12/17/18, 3:00-5:00 pm

Required Text: Garrison and Ellis, *Oceanography: An Invitation to Marine Science* 9th edition; available at BU bookstore.

Required App: Turningpoint (available for iOS and Google play)

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

Password: #BUOceans2018

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. You will also learn about how human activities alter the ocean, and how the ocean makes our earth habitable.

Course objectives:

- You will identify the ways the four major disciplines of oceanography (physical, geological, chemical, and biological) investigate the controls of oceanic circulation, the connections between the ocean and the atmosphere, the impact of ocean chemistry on life, and the ecology and biology of the ocean as well as interactions between humans and the ocean. You will learn how scientists employ interdisciplinary methods to explain the complexity of the physical world and the human impact on it. (*Scientific Inquiry I*)
- You will recognize the ocean as a site of conflict and opportunity among and within human cultures, and you will discuss the ways exploration, commercialism, and food

production continue to impact intercultural relations. You will also analyze the ocean as a site for the study of climate change. (*Ethical Reasoning*)

- As the course begins with intercultural contacts and proceeds to human interactions with the environment, you will contend with the ethical issues that face communities when oceans bridge them and affect their livelihood, and you will examine the ways your own communities and interactions with the ocean may affect future generations. (*Ethical Reasoning*)

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.

Diversity & Inclusion – Diversity enriches all research and education, and is realized only with all voices, views, and perspectives operating within a supportive and respectful community. For this reason, the Department of Earth & Environment, including myself are committed to fostering diverse, inclusive, and equitable living, learning, and working environments that are supportive and free from violence, harassment, disruption, and intimidation. As a student taking this course, you are also committing to fostering such an environment. Further, the Department of Earth & Environment recognizes that creating a safe environment and a culture of respect is the shared responsibility of all members of our community. To ensure an equitable environment that values and respects the unique experiences and perspectives of our community, the Department, including myself are dedicated to promoting diversity, inclusion, and equity among all members of our departmental community and encouraging open, honest, and compassionate communication. Again, as a student enrolled in this course you are committing to creating such an environment. You can read more about our departmental efforts for fostering a safe, inclusive, learning environment here: <http://www.bu.edu/earth/about/diversityinclusion/>.

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 30%. In class participation is worth the final 10% of your grade. (Note all marine science majors are required to also sign up for the marine discussion and your grade are calculated differently. We will go over these details in the first discussion). The exams are based on what we discuss in class *and* on the readings, and are generally multiple choice. 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.

Attendance and make up exams: Your attendance is required at all lectures and, of course, exams. Students who attend lecture earn much better grades compared to those who do not. Attendance and participation is part of your grade. Under extenuating circumstances, we can reschedule an exam. If you have any allowances for exam taking please tell me as early as you can in the semester so we can make the proper arrangements.

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 <http://www.bu.edu/academics/policies/academic-conduct-code/>. Cases of academic misconduct will be promptly referred to the Dean's Office.

Finally, please refer to the University's policy on Religious Observance (<http://www.bu.edu/chapel/religion/>) and the Multi-faith Calendar (<http://www.interfaith-calendar.org/>)

Laptop and Cell phones: You may use laptops to take notes and respond to the in-class questions/quizzes. You may use your cell phone to respond to in class questions/quizzes. Any other activity is a distraction and I will ask you to put your laptop/cell phone away. If you continue to use the device inappropriately then you can 1) leave class or 2) put the item in the front of the room.

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.who.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/>

Please note, this is our working schedule – it will likely change.

	Date	Topic	Reading
September	5	Introductions	NA
	7	Why Oceanography?	you pick
	10	History of Ocean Exploration - from the pioneers to present	2
	12	Origin of the solar system, the earth, and its oceans	1
	14	Plate Tectonics 101- Theory and Evidence	3
	17	Plate Tectonics - Shape of the Ocean Basins	3
	19	Plate Tectonics - Mid-Ocean Ridges, Subduction zones, Volcanic arcs	3
	21	Biogenic Oozes, Turbites, and more!	5
	24	Special Topic Lecture: Warming waters, rising seas	TBD
	26	Exam I - Readings and Lecture from 9/5-9/24	
	28	<i>Guest Lecture:TBD</i>	
October	1	Water, Water everywhere and not a drop to drink	6 & 7
	3	Something wicked this way comes - atmospheric circulation	8
	5	Ocean Circulation I - Judging A Book by Its Cover	9
	8	Holiday - No classes	
	9	<i>Monday Schedule - Ocean Circulation II - It's So Much Deeper Than You Thought</i>	9
	10	Surf Lessons	10
	12	Tides are waves too.	11
	15	Light and Photosynthesis	13
	17	Limiting Nutrients in the Ocean	14
	19	Exam II - Readings and Lecture from 9/22-/10/15	
	22	Global Ocean Productivity - Where, Why, and How do we know?	14
	24	The Sea is on Fire - Harmful Algal Blooms and Red Tides	14
	26	Special Online Lecture: The Undiscovered - Radcliffee Insitute for Advanced Study	
	29	Life not from Sun - Hydrothermal vent communities	16
31	Food Webs and Energy Transfers	13	
November	2	Special Topic Lecture: The Immortal Life of Jellyfish	NA
	5	Tiny Water Column Dwellers -Zooplankton	15
	7	Invertebrates - from small worms to colassal squid	15
	9	Everything you need to know about Fish	15
	12	Marine Mammals and other Charismatic Megafauna	15
	14	Life in the Deep Ocean Water Column	
	16	Exam III - Readings and Lectures from 10/17-11/17	
	19	Special Topic Lecture: Gauno Wars and your Nitrogen Footprint	NA
	21-25	Thanksgiving Break - Gobble Gobble	
	26	Do Sea Monsters Exist?	
	28	Coral Reefs	links online
30	Ocean Birds	links online	
December	3	Salt Marshes & Mangroves	links online
	5	To fish or not to fish? To whale or not to whale?	links online
	7	Beyond all things it the ocean...	links online
	10	The Future of Ocean Research	links online
	12	Final Exam Review	