OC/GEO 103
Exploring the Deep

2009 Overview

Spring Term
4 credits
Baccalaureate Core Course
(Perspectives Category: Physical Science)
No Prerequisites
Course website: http://dusk.geo.orst.edu/oceans

Lecture in Gilfillan Auditorium, MWF 1:00-1:50 p.m.
Labs in Educ 126:
M 2:00-3:50 p.m., 4:00-5:50 p.m., and 6:00-7:50 p.m.
T 12:00-1:50 p.m. and 5:00-6:50 p.m.
W 8:00-9:50 a.m., and 2:00-3:50 p.m.
R 9:00-10:50 a.m., 12:00-1:50 p.m., 6:00-7:50 p.m.
F 9:00-10:50 a.m. and 2:00-3:50 p.m.

REGISTRATION PROBLEMS? Please contact our registration manager, Melinda Peterson, 104 Wilkinson Hall, petersom@geo.oregonstate.edu, 7-1238.

Explore the Deep!

The oceans affect your life whether you live on the coast or hundreds of miles inland. Along Oregon's coast the livelihoods of most people are tied directly to industries related to the oceans, although many ocean-derived foods and products are used throughout the state. Even our weather results from interactions between the atmosphere and the oceans.

"Exploring the Deep..." presents the geography, geology, chemistry, physics, and biology of the oceans, thus integrating basic principles from each of these sciences into an understanding of the earth.

Please note that this is NOT a class about fishes or whales. Topics relating to fish, fish populations, and whales will be discussed, but the emphasis is on earth processes relating to the oceans. This means that considerable time will be spent on the processes in the ocean basins, the water column, and the atmosphere. This course provides a comprehensive survey of oceanography at a level appropriate for non-science students. In addition to providing an overview of the geography and processes in the oceans, the material focuses on ocean-related hazards and environmental problems, including earthquakes and tsunamis, marine pollution, coastal development and erosion. Laboratory exercises are designed to provide the students with hands-on experience in analyzing ocean data and problems, leading to a better understanding of the course material, and of scientific methods. This will also involve **thinking critically** about oceanographic data and issues (i.e., assessing evidence and claims, and making objective judgements on the basis of well-supported reasons and scientific evidence).

Lecture Topics Include...

- Some historical perspective on ocean exploration and science and the evolution of major theories and ideas about how the oceans work.
- Formation of the Earth, its oceans and ocean basins
- Erosion and major earthquakes *along* the Oregon coast

- Volcanic activity along a major volcanic chain just *off* the Oregon coast
- Cause and effects of El Niño
- Chemistry of sea water and of underwater hot springs
- Climate change and global warming
- Biology of the oceans, from one-celled organisms to sharks and giant squid
- The interaction of science and society, particularly with regard to ocean conservation
- ...and more

Learning Outcomes

By the end of this course, we expect that you will be able to:

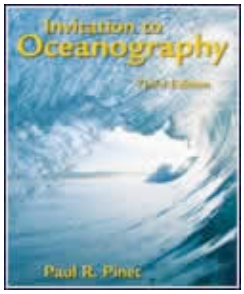
- Demonstrate knowledge about major geological, physical, chemical, and biological features and processes in the oceans.
- Describe examples of major processes, such as seafloor spreading, El Nino, upwelling, tidal fluctations, where they occur in the oceans geographically and why they are important.
- Interpret and use common representations of ocean features (maps, graphs, diagrams of the sea floor, the water column, the sea surface, etc.).
- Evaluate significant ocean and coastal problems that impact public policy debates.
- Identify and critically appraise the scientific content of relevant media discussions of oceanographic issues, particularly along the Oregon coast.
- Develop a greater appreciation for ocean management, conservation, and protection, globally.
- Understand the nature, value, and limitations of scientific methods at sea and on shore (this will be discussed in lecture and experienced firsthand in lab)

Required Materials/Activities

Required Lab Manual: ***Laboratory Manual: Exploring the Deep for the Earth Sciences***
2010 by Michelle K. Hall et al., Cengage/Thomson Publishers, ISBN 111-122-262-2. Available from the OSU Bookstore.

REQUIRED FIELD TRIP to the Oregon Coast (Sat., May 30th)

OPTIONAL Textbook: ***Invitation to Oceanography***



Fifth Edition, 2009 by Paul R. Pinet, Jones and Bartlett Publishers, ISBN 978-0-7637-5993-3.
Available from the OSU Bookstore and will be ON RESERVE for free in the library.

Instructors and TAs

Drs. Dawn Wright and Robert Duncan
Click here to meet them! (http://dusk.geo.orst.edu/oceans/profs.html)

- Office Hours for **Dr. Wright:** MW 1:50-2:50 p.m., or by appointment, Wilkinson 114, 737-1229, dawn-at-dusk.geo.orst.edu
- Office Hours for **Dr. Duncan:** MW 11:00 a.m. -12:00 p.m., COAS Admin Lounge, 737-5206, rduncan-at-coas.oregonstate.edu

TAs: Evan Bing-Sawyer (2 sections), Tiffany Gregg (2 sections), Wendy Kelly (3 sections), Andrew McFadden (3 sections), Colleen Weiler (2 sections)

Email all TAs

Lecture Notes

Lecture notes, as prepared by the professors, will be downloadable from the course web site at dusk.geo.orst.edu/oceans/103syl.html. We have provided this option so that you will be able to download the notes before a lecture and use them while in class to help you keep up with and understand what is going on.

Class Attendance

Class attendance is **MANDATORY**! Even with the provision of lecture notes on the web, you are SELLING YOURSELF SHORT IF YOU SKIP CLASS, which gives you the opportunity to **interact** with the professors and the other students for increased understanding and ENJOYMENT of the material. There is also quite a bit of material that we cover in class that will NOT be covered in the book, or may NOT be posted on the web. Also, please note that **Student Health Services has a policy of NOT providing medical documentation to explain absences from classes or poor performance on examinations.**

Classroom Etiquette

Please do not hold conversations with classmates whenever the professor or another student is speaking. Also refrain from writing and passing notes or participating in other distractive behavior. **Please do not get up and leave in the middle of or near the end of class!** If you have an outside appointment with a doctor or campus official that necessitates this please let the professors know before class begins. **Your undivided attention in class is a must. An atmosphere of mutual respect is in order.** The professors will not tolerate disrespectful conduct. This is not only a class about oceanography, it is training for your life and work *after* college. Do you think that your future employer will be willing to overlook disrespectful behavior or reassign you to tasks that you find more congenial? We think not!

The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office. For more information check out the University's mission and values statement, available at oregonstate.edu/mission.

Exams and Grading

Test 1 will be worth 15% of the grade, Test 2 15%, Laboratories and Field Trip 40%, and a Cumulative Final (focusing more on the second half of the term) 30%. *NO MAKE-UP EXAMS WILL BE GIVEN*, except in the case of: (1) serious illness or family emergency (you MUST provide us with a note from your doctor or relative); or (2) employment obligation (you MUST provide us with a note from your supervisor).

Regarding the final exam, the university carefully schedules exam periods for all departments and colleges on campus so that there should be NO CONFLICTS. In other words, you should not have to worry about another final exam being scheduled during the final exam for this course. This *may* happen only in the case of small-enrollment courses. If this situation does arise you MUST provide us with a note from the instructor of the conflicting course. **These policies will be strictly enforced!!!!** If you miss an exam because you overslept, were clueless about carefully reading this syllabus or the Schedule of Classes, etc., etc., you are out of luck!

Weighted Percentages are used as a guide for determining final GEO/OC grades at the **end of the term** (we do not assign letter grades before then!!):

Sample Weighted Percentage Calculation:
TOTAL=((M/100)*15)+((T/100)*15)+((L/400)*40)+((F/200)*30)
where M = Test 1 score, T = Test 2, L = cumulative lab score, F = final exam

Final Letter Grade Ranges for Total Weighted Percentages:

- A = 95 -100
- A- = 90-94
- B+ = 85-89
- B = 80-84
- B- = 75-79
- C+ = 70-74
- C = 65-69
- C- = 60-64
- D = 55-59
- F = 54 or below

Academic Dishonesty

Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

- **cheating** - use or attempted use of unauthorized materials, information or study aids
- **fabrication** - falsification or invention of any information
- **assisting** - helping another commit an act of academic dishonesty
- **tampering** - altering or interfering with evaluation instruments and documents
- **plagiarism** - representing the words or ideas of another person as one's own; turning in a paper identical to that of a classmate (even if you worked on the project together)

For more information about academic integrity and the University's policies and procedures in this area, please visit the Student Conduct web site at: oregonstate.edu/studentconduct/.

Students w/Special Challenges

Students with documented disabilities who may need accommodations, who have any emergency medical information the instructors should know of, or who need special arrangements in the event of evacuation, should make an appointment with either instructor as early as possible, no later than the first week of the term. For further information regarding accomodations for students with disabilities in this class, please see the SSD web site at: ssd.oregonstate.edu.

Last update: February 8, 2010

Syllabus

Spring 2010

Last updated at 9:23 p.m., Monday, June 15, 2009
Click on Dates, Lecture #s, and Lecturers to get info....

Date	Lecture #	Topic *Background Reading* PPT = PowerPoint file	Lecturer
M Mar 29	1	**Introduction, Marine Science at OSU** ***Please READ YOUR SYLLABUS!*** **PPT | Marine Science at OSU web site**	**Wright / Duncan** Guest speaker: John F. Kennedy
W Mar 31	2	**The Study of the Oceans | PPT** ***Chapter 1***	**Wright**
F Apr 2	3	**Shape of the Ocean Floor | PPT** ***Chapter 2***	**Wright**
M Apr 5	4	**The Shifting Crust/Plate Tectonics | PPT** ***Chapter 3*** Additional Resource: Plate Tectonics Flash animations	**Wright**
W Apr 7	5	**Creation, Aging, and Recycling of the Ocean Floor | PPT** ***Chapter 3***	**Duncan**
F Apr 9	6	**Earthquakes, Tsunamis, Volcanoes and Sea Level | PPT** ***Chapter 3*** Additional Resource: Big Earthquake Coming Sooner than Thought (*Oregonian* article)	**Duncan**
M Apr 12	7	**Hot Spots, Plumes, and Mass Extinctions | PPT**	**Duncan**
W Apr	[illegible]	**Origin and Distribution of Sediments | PPT**	

W Apr 14	8	***Chapter 4***	Duncan
F Apr 16	9	**Paleoceanography and Climate Change | PDF** (WARNING: 30.7 Mb in size!)	Guest speaker Andreas Schmittner
M Apr 19	10	**Properties of Seawater | PPT** ***Chapter 5: pp. 133-151***	Wright
W Apr 21	--	**MIDTERM 1**	--
F Apr 23	11	**Chemical and Physical Structure of the Oceans | PPT** ***Chapter 5: pp. 152-174*** Additional Resource: Name That Sound in the Sea!	Duncan
M Apr 26	12	**Chem/Phys Structure + Ocean Acidification and Carbon-Cycle | PPT**	Duncan
W Apr 28	13	**Ocean Surface Circulation | PPT** **Coriolis movie** ***Chapter 6: pp. 185-207***	Duncan
F Apr 30	14	**Deep Ocean Circulation | PPT** ***Chapter 6: pp. 208-222***	Wright
M May 3	15	**El Niño and La Niña | PPT** Pressure Demo El Niño animation 1 | El Niño animation 2 La Niña animation	Wright
W May 5	16	**Waves in the Ocean | PPT** ***Chapter 7*** Energy Demo Wave motion animation | Wave refraction animation	Wright
F May 7	17	**Waves *cont.* | PPT** ***Chapter 7*** Oregon Coastal Atlas OSU Wave Tank Movie Additional Resources: Tsunami animation Hurricanes & Coastal Management	Wright
M May 10	18	**Satellite Oceanography | PPT**	Guest Speaker Peter Strutton

W May 12	**19**	***Gliding* Through Coastal Oceanography | PPT** Real-Time Glider Data	**Guest Speaker Kipp Shearman**
F May 14	**20**	**The Prince of Tides | PPT** ***Chapter 8*** Tidal cycle animation	**Wright**
M May 17	**--**	**MIDTERM 2**	**--**
W May 19	**21**	**Ocean Wave Energy | PPT (36 Mb!)** Additional Resources: Related OSU Press Release *Daily Astorian* article (pdf)	**Guest speaker Ted Brekken**
F May 21	**22**	**Biological Productivity/Ocean Ecosystems | PPT** ***Chapters 9 and 10***	**Wright**
M May 24	**23**	**Life in the Deep Blue | PPT** ***Chapter 9*** Giant squid link	**Wright**
W May 26	**24**	**Fisheries | PPT**	**Duncan**
F May 28	**25**	**Oregon Intertidal Communities | PPT** Oregon Coastal Atlas link Common Species Handout	**Wright**
Saturday May 30	**--**	**FIELD TRIP to OREGON COAST** Additional Resources: Seal Rock State Park OSU HMSC Summer Programs in Marine Science OSU HMSC Marine Science Internships	**--**
M May 31	**--**	**MEMORIAL DAY HOLIDAY**	**--**
W Jun 2	**26**	**Human Impacts and Ocean Uses | PPT**	**Duncan**
F Jun 4	**27**	**Wrap Up & Review for Final**	**Duncan/Wright**
Monday, June 7	**--**	**FINAL EXAM** **12:00-2:00 p.m., Gilfillan**	**--**

Last update: June 15, 2009
http://dusk.geo.orst.edu/oceans/103syl.html

Labs

Spring 2010
Wilkinson 210

Laboratory assignments are REQUIRED work.
Required lab book is *Exploring the Deep: GEO/OC 103 Lab Manual* ,
which consists of geographic information system (GIS) exercises and data from the GIS Investigations for the Earth Sciences series (ArcGIS 9.x)

Eight laboratories will be counted (lowest score from Labs 1-8 dropped), resulting in 40% of your final grade.
SCROLL TO BOTTOM OF PAGE for daily lab schedule.

Lab	Topic	Dates
0	**No Lab**	**Mar 29-Apr 2**
1	**Intro. to Lab and Software** **Lab 1: The Ocean Basins - Part I** Read introductory pages Activity 1.4, Beneath the Waves	**Apr 5-9**
2	**Lab 2: The Ocean Basins - Part II** Activity 1.3, Ocean Origins Activity 1.5, Ocean Basin Features	**Apr 12-16**
3	**Lab 3: Introduction to Ocean Cores** Part 1. Earth History Archives Part 2. How are Ocean Cores Obtained?	**Apr 19-23**
4	**Lab 4: Ocean Chemistry and Currents** Activity 2.1, A Puzzle at 70°N Activity 2.3, Current Basics	**Apr 26-Apr 30**
5	**Lab 5: Ocean-Atmosphere Interactions** Activity 3.3, Climate Oscillations Activity 3.4, El Nino and La Nina	**May 3-7**

6	**Lab 6: Tsunami Hazards** Activity 5.3, Anatomy of a Tsunami Activity 5.4, Tsunami Warning	**May 10-14**
7	**Lab 7: Marine Productivity - Part I** Activity 4.1, Bounty from the Sea Activity 4.2, The Life-Giving Ocean	**May 17-21**
8	**Lab 8: Marine Productivity - Part II** Activity 4.3, Resources for Productivity Activity 4.5, Searching for Solutions	**May 24-28**
9	**Lab 9: Complete and turn in your writeups from the Field Trip**	**Due by 5:00 Jun 4**

Lab Schedule/TAs

Email all TAs (or click individually below)...

	Monday	Tuesday	Wednesday	Thursday	Friday
8-9:50			TBD Section 13 Dr. Duncan visits		
9-10:50	TA/Profs Mtg Wilk 204 9:15-9:45			TBD Section 21 Dr. Duncan visits	TBD Section 15 Dr. Wright visits
11-12:50					
12-1:50		TBD Section 12 Dr. Wright visits		TBD Section 16 Dr. Duncan visits	
2-3:50	TBD Section 14 Dr. Duncan visits		TBD Section 10 Dr. Wright visits		TBD Section 19 Dr. Wright visits
4-5:50	TBD Section 17 Dr. Duncan visits				
5-6:50		TBD Section 18 Dr. Wright visits			
6-7:50	TBD Section 11 Dr. Duncan visits			TBD Section 20 Dr. Wright visits	

TA Office Hours:
COAS TA 1: Mon 12-1 pm, Wed 2-3 pm, Patullo Library of COAS Admin Bldg.
COAS TA 2: Wed 9-10 am, Patullo Library of COAS Admin Bldg.
COAS TA 3: Fri 2-4 pm, Weniger 509
GEO TA 1: Wed 10-11 am, Wilkinson 145
GEO TA 2: Tues/Thurs 2-3 pm, Wilkinson 025 (basement)

Last update: January 18, 2010
http://dusk.geo.orst.edu/oceans/103labs.html

Meet the Professors of GEO/OC 103

Dr. Dawn Wright, professor of Geography and Oceanography, joined the OSU faculty in 1995. She earned an interdisciplinary Ph.D. in marine geology and physical geography at the University of California at Santa Barbara, and has focused much of her studies on the forces responsible for change along seafloor-spreading centers, as well as the benthic zones and habitats of coral reefs. She has completed oceanographic field work in some of the most geologically active regions on the planet, including the East Pacific Rise, the Mid-Atlantic Ridge, the Juan de Fuca Ridge, the Tonga Trench, and volcanoes under the Japan Sea and the Indian Ocean. She started off her career sailing on 10 legs of the Ocean Drilling Program (ODP), where she first met Dr. Duncan in the late 1980s! ODP ran until 2003 and conducted basic research into the history of the ocean basins and the nature of the crust beneath the ocean floor.

Visit Dr. Wright's Home Page (dusk.geo.orst.edu)
Follow Dr. Wright on Twitter (twitter.com/deepseadawn)

Dr. Bob Duncan, professor of Oceanography and Associate Dean of the College of Oceanic and Atmospheric Sciences, joined the OSU faculty in 1977. He earned his Ph.D. in marine geology at the Australian National University and is a world-renowned expert on island volcanoes, ocean floor basalts, and hotspots, with special interests in the geochronology of ocean floor and ocean island basalts. Dr. Duncan has also been heavily involved in the Ocean Drilling Program, serving on several ODP expeditions as a lead scientist. ODP has now transitioned to the Integrated Ocean Drilling Program (IODP), one of the premiere global earth science programs in existence today. Dr. Duncan has continued his involvement there, serving on several important IODP panels and committees.

Visit Dr. Duncan's Home Page (www.coas.oregonstate.edu/index.cfm?fuseaction=content.search&searchtype=people&detail=1&id=524)

http://dusk.geo.orst.edu/oceans/profs.html