The Maritime Studies Program of Williams College and Mystic Seaport

***** Oceanographic Processes - Spring Semester 2013 *****

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Introduction and Philosophy

In this course, we will examine many important ocean and coastal environmental science issues: carbon dioxide and the ocean's role in climate, El Niño and the ocean's role in weather, coastal erosion, coastal pollution, and fisheries – an important food source on the planet. Our focus will be on underlying processes, rather than equations or facts. Our approaches will be regional and global, theoretical and practical, hands-on and discovery-based. The marine sciences will inform the rest of your Williams-Mystic semester, that is, your interdisciplinary study of marine issues.

Learning opportunities abound throughout the semester. We will spend 11 days together at sea in the Straits of Florida and Gulf of Mexico, where you will gain experience with oceanographic sampling and laboratory equipment. We will explore New England coastal environments on labs and field trips. We will travel to the Pacific Northwest and Louisiana for, among other things, a comparative study of coastal oceanography. You will collect and analyze your own field data and/or laboratory data for an independent research project. We will meet twice a week for our regular class, but there will also be many integrated classes, guest lectures, and other special events that incorporate oceanography with one or more other disciplines at Williams-Mystic.

I will help you and expect each of you individually to broaden and deepen your scientific skills and knowledge, in accordance with your own background and interests. If you bring a particular relevant interest, please come discuss it with me and we'll work to include it in the course and/or your research project. Likewise, if you have a particular learning style that works best for you or a documented learning disability, please come see me. I will, of course, make all reasonable accommodations to help you succeed.

Schedule

We'll meet in the Marine Science Center (MSC) on the following days/times unless otherwise noted in the calendar or announced:

Lecture (classroom): 0930-1045 h Tuesday and Thursday
Laboratory (lab room): 1300-1630 h Tuesday (and/or Thursday, depending on tide)

I encourage you to come discuss the course, your research projects, extra help, etc., with me anytime. My office is upstairs in Labaree House and my lab is downstairs in the MSC. Tuesdays and Thursdays after class I am usually available in my lab 1045-1200.

Important dates

Research Project Proposal due	Tue 2/26 (0900, via e-mail)
Research Project Introduction due	Tue 3/26 (0900, via-email)
Exam 1	Tue 4/9 (0930-1045)
Research Project Methods due	Tue 4/16 (0900, via-email)
Research Project Results +Discussion due	Thu 4/25 (0900, via email)
Research Project Presentations	Thu 5/2 (0900, presentation due to T.A.)
Research Project Paper due	Sat 5/4 (1700, via email)
Exam 2	Tue 5/15 (0930-1045)

Reading

Our textbook is *Introduction to Ocean Sciences* by Douglas Segar, 1st ed., 1998; ISBN 0314097058. You may borrow a copy (we have a full set) or buy your own. Additional reading assignments from books, journals, etc., will be distributed in class.

Grading

15% Labs, assignments, in-class activities, and participation
35% Exams
50% Research Project (5% proposal, 10% drafts, 5% oral presentation, 30% final paper)

Lecture

During "lecture" periods both on campus and in the field, you will participate in discussions, hands-on activities, problem-solving, and presentations. I encourage you to bring to class comments and questions on the reading, current events, previous lectures, field seminars, labs, or anything relevant. Readings are listed on the calendar (p. 3) and I will often give out a 'Question of the Day' before class; please come to class ready to participate.

Field work and Labs

You will participate in many field and in-class laboratory exercises, leading up to and in addition to your own original research pursuits. You will enjoy field labs more if you are dressed appropriately: knee-high rubber boots and layers of old, comfortable "sacrificial" clothes. Lab tools and equipment will be provided. Lab assignments will usually be due at the next class meeting. Unless I specify that you must work alone on a particular lab or assignment, you may discuss your thoughts with others. However, always write answers in your own words.

Exams

There will be two exams during the semester. Labs, fieldwork, lectures, readings, assignments, field seminars, and anything else we do or cover during the semester is potential material for exams. Exams are one of the few aspects of this course I require you do alone, without assistance from each other or reference materials.

Research Project

An important component of this course is the research project you will design, implement, and present (orally and in writing). Your research project can be nearly any original scientific investigation within the broad category of ocean science that you can accomplish during your semester here. This is not a literature search or review; you will be making and testing hypotheses quantitatively in the field and/or lab. You may work alone or with a partner. All projects will result in one proposal, one paper and one presentation; for joint work both students earn the same grade.

We will meet early in the semester to discuss your ideas for a topic before you submit a proposal. Research topic ideas can come from a variety of places including your offshore experience, labs, fieldwork, lectures, and/or work by other researchers. I encourage you to begin by browsing the binders of student papers in the MSC lab. Specific steps to the research project are outlined in the Science Research Projects handout. Please communicate with me at all stages of the project.

Honor Code

As in all your pursuits this semester, you are bound by the Williams-Mystic honor code, which is discussed in a meeting with the director early in the semester. If you have any questions about ethics or the honor code, please come talk with me, or the director, at any time.

Calendar

Week	Day	Time	Topic *	Reading**
1	Thu 1/24	0930	Introduction	
2	Mon 1/28	1000	Lab 1: Practical Marine Meteorology	
	Tue 1/29	0830	Coastal Piloting and Navigation	CC2
2&3			OFFSHORE FIELD SEMINAR	Offshore Reader (all)
4	Thu 2/14	0930	Origin of the Ocean	Ch. 3, Ch. 4
	Thu 2/14	1045	Lab 2: Mystic River Estuary	Ch. 13
5	Tue 2/19	0930	Ocean Basin Evolution and Isostasy	CC1, CC3, CC7
	Tue 2/19	1300	Lab 3: Napatree Barrier Beach	Ch. 11
	Thu 2/21	0930	Coastal Erosion & Why is the Ocean Salty?	Ch. 5, Ch. 6, CC12
	Thu 2/21	1300	Lab 4: Barn Island Salt Marsh	CC2
6	Tue 2/26	0900	*Proposals due*	
	Tue 2/26	0930	Geostrophic Currents	p. 228-241
	Tue 2/26	1330	Lab 5: Weekapaug Rocky Intertidal Zone	p. 442-447
	Thu 2/28	0930	Thermohaline Circulation	p. 206-228
	Thu 2/28	1430	Lab 6: Geography and Geology of the Pacific Northwest	
7			PACIFIC NORTHWEST FIELD SEMINAR	PNW Reader (all)
8	Thu 3/14	0930	Tides and Waves	Ch. 9, Ch. 10
	Thu 3/14	PM	Lab 7: Research Lab	
9	Tue 3/19	0930	El Niño – Southern Oscillation	p. 187-192
	Tue 3/19	PM	Lab 8: Research Lab	
	Thu 3/21	0930	Marine Weather and Hurricanes	Ch. 7; Diamond, 2013
10	Tue 3/26	0900	*Introductions due* via email	
	Tue 3/26	0930	Hurricane Impacts	
	Tue 3/26	PM	Lab 9: Research Lab	
	Thu 3/28	0930	Hurricanes and Land Loss in Louisiana	Schwartz & Robertson, 2012
11			LOUISIANA FIELD SEMINAR	MRD Reader (all)
12	Mon 4/8	1930	Review	
	Tue 4/9	0930	*Exam 1*	
	Tue 4/9	PM	Lab 10: Research Lab	
	Thu 4/11	0930	Controls on Primary Productivity in the Ocean	Ch. 12, CC13, CC14
13	Tue 4/16	0900	*Methods due via email*	
	Tue 4/16	0930	Eutrophication	Ch. 13
	Tue 4/16	PM	Lab 11: Research Lab	
	Thu 4/18	0930	Harmful Algal Blooms (student presentations)	Ch. 16
14	Tue 4/23	0930	The Iron Hypothesis and the Biological Pump	Chisholm, 1995
	Tue 4/23	PM	Lab 12: Research Lab	
	Wed 4/24	0830	Interdisciplinary Seminar on Whales and Whaling	
	Thu 4/25	0900	*Results and Discussion due via email*	
	Thu 4/25	0930	Fish and Fisheries	Jackson et al., 2001
15	Tue 4/30	0930	Climate Change and Carbon Dioxide	CC9
	Thu 5/2	0900	*Project presentation due* to TA	
	Thu 5/2	0930	Climate Change and the Global Ocean	p. 82-84
	Thu 5/2	1300	*Research Project Presentations*	
	Sat 5/4	1700	*Research Paper due* via email	
16	Tue 5/7	0930	Hydrothermal Vents	p. 452-455
	Thu 5/9	0930	Synthesis	
17	Wed 5/15	0930	*Exam 2*	

**This schedule is subject to change to meet the needs of the group. **Readings listed from your text are indicated with Ch = Chapter; CC = Critical Concept. Additional readings from other sources will be distributed in class. Readings should be done before class meets.*