Biology 25: Marine Biology
Spring 2013
General Information

Professor: Celia Y. Chen, Rm. 126 Class of '78 Life Sciences Center, HB 6044
Celia.Chen@dartmouth.edu

Graduate Teaching Assistant: Tyler Pavlowich, 112 Fairchild Hall
Tyler.T.Pavlowich.GR@dartmouth.edu

Schedule: Lecture MWF 11:15-12:20 (11-period)
X-period, Tuesday 12:00-12:50

Location: Lectures and X-hours, 105 Life Sciences Center
(unless otherwise announced)

Office hours: C. Chen M 2:00-3:00, W 2:00-3:00 (also by appointment)
T. Pavlowich T 10:45-11:45, Th 1:00-2:00 (also by appointment)

Course purpose:
The overall objective of the course is to examine how abiotic (physical, chemical) and biotic factors (interactions with other living organisms) shape the ecological characteristics of organisms in marine ecosystems. We will also examine the role of anthropogenic effects in these ecosystems and the complexity of the resulting science/policy issues.

Required Books:
Textbook: Levinton, 2010, *Marine Biology* (paperback), Oxford University Press, 3rd Revised International Edition. Reading assignments will be noted on each lecture outline. The pages listed in the lecture schedule below are only *tentative* assignments for the textbook (Levinton) and do not include additional scientific papers and reports which will be assigned and handed out with each lecture.

Other Books:
Sylvia Earle, *The World is Blue*, 2010, National Geographic. This book is by a world renowned oceanographer and ocean explorer. Based on her vast experience studying and exploring the oceans, this is her personal account of her environmental concerns about the oceans and their resources.

Ray Hilborn, *Overfishing: What Everyone Needs to Know*, 2012, Oxford University Press. This book is by a very well known fisheries biologist at the University of Washington. It breaks down in very basic terms the complex issues of overfishing.

***X-period*:** X-Hours will be used for lectures and films. Film content will be covered in exams. Students are welcome to bring their lunches to class on those days.

Hourly Exams: 2 hourly exams and a final exam (1^{st}: 20%, 2^{nd}: 25%, 3^{rd}: 30%). For each exam, 90% of the content will be from lectures and required readings, 10% from films and discussions. Exam format (10-15 short essays). The final exam will not be cumulative.

Field Trip: Location Marine Biological Laboratory (MBL), Woods Hole MA, and Waquoit National Estuarine Research Reserve, Falmouth MA.
Saturday to Sunday, May 4th (6AM) to 5th (6PM)
The field trip will have three components: 1) going out on the research vessel, the *Gemma*, to sample for marine organisms; 2) Visit the Marine Resources Center (MBL) where marine organisms are cultured for ecological and biomedical research; 3) Plant identification and data collection on a local salt marsh.

Writing Assignment:
There will be a writing assignment involving research on a marine biology research topic of your choice. The assignment will involve investigating primary scientific literature on a topic of interest to you and developing a set of testable questions based on and supported by the current state of the research. The investigation will culminate in a short paper written in the style of an introduction to a scientific paper. The assignment will be due in the middle of the term and comprise 15% of the final grade.

Required Reading and Class Discussions:
The book, *The World is Blue*, will be the focus of our discussions in the first half of the term. There will be assigned readings from the book and subsequent class discussions on marine science topics with policy relevance. Students will be required to hand in discussion questions prior to the class and be prepared to participate in a discussion.

Overfishing: What Everyone Needs to Know This book will be the focus of a class discussion and a starting point for talking about the interaction between fisheries and science in the second half of the course. These same types of issues pertain to most commercially caught species in the oceans. We will have a class discussion on the science and the policy issues concerning one of the fisheries.

Group Presentations: There will be student group presentations on the scientific and policy issues surrounding three different fisheries. In each topic area, groups of students will represent industry, environmental advocates, or government regulators. Groups will turn in a summary of the major points of their presentation that will comprise 5% of the final grade. All students will be responsible for material presented by all of the groups.

GENERAL COURSE ISSUES

Special Accommodations: "Students requiring disability-related accommodations must register with the Student Accessibility Service office. Once SAS has authorized accommodations, students must show the originally signed SAS Accommodations/Consent Form and/or a letter on SAS letterhead to their professor. As a first step, if students have questions about whether they qualify to receive accommodations, they should contact the SAS office. All inquiries and discussions about accommodations will remain confidential."

Religious Observances: Students may wish to take part in religious observances that fall during this academic term. Should you have a religious observance that conflicts with your participation in the course, please come speak with me before the end of the second week of the term to discuss appropriate accommodations.

Athletic Obligations: While it is important for students to meet their commitments to their athletic teams, it is also their responsibility to meet their academic ones. When missing class for athletic events, it is highly recommended that students meet with me or the TA, Tyler Pavlowich, to make up material covered in the lecture.

Honor Code: As with all courses, you are expected to follow the guidelines of *Sources, Their Use and Acknowledgment* that can be found on the internet at www.dartmouth.edu/~sources/. The sections most relevant to this course are in the section, "What is plagiarism?" Citation formats for papers and projects will be discussed in class.

Lecture Schedule

Date	Topic	Assignment
M 25 Mar	Introduction to Marine Systems	pp. 3-15, *46-78* *Paul Snelgrove TED talk*
Tu 26 Mar	*Film: "Journey to the Ocean Floor"*	
W 27 Mar	The World Oceans: Geologic and Physical Environment	pp. 17-43
Coastal Margins		
F 29 Mar	Estuaries	pp. 96-98, 400-407 *Film: "Poisoned Waters"* (Ches. Bay)
M 1 Apr	Rocky Intertidal – Habitat, Zonation, and Ecology	pp. *279-306*, 334-348,
Tu 2 Apr	Class discussion: *The World is Blue, The Vision*	Chapter I
W 3 Apr	Guest Lecture (Dr. Mark Bertness, Brown University)	pp. 385-394
F 5 Apr	Sandy and Muddy Shores	pp. 321-334, 375-381
M 8 Apr	Salt Marsh Ecosystems	355-375
Tu 9 Apr	A Guide for Doing Research (Dr. Pamela Bagley, Librarian)	
W 10 Apr	*Marine invertebrate Lab dissection* (LSC 106)	
F 12 Apr	Class Discussion: Oil Spills: Are they all the same?	Reading TBA
The Pelagic Zone		
M 15 Apr	Plankton - Phytoplankton and Primary Productivity	pp. 225-248
Tu 16 Apr	Class discussion: *The World is Blue, The Reality* and *Now is the time*	Chapters II and III, *Sylvia Earle TED talk*
W 17 Apr	Harmful Algal Blooms (outline due)	pp. 178-184
F 19 Apr	Planktonic Food Webs and the Microbial Loop	pp. 258-269
M 22 Apr	**Hour Exam I**	
Tu 23 Apr	Class discussion of *"Journey to Planet Earth"*	*Film: "Journey to Planet Earth: The State of the Oceans"*
W 24 Apr	Plankton - Zooplankton Communities	pp. 167-178, 248-253
The Nekton		
F 26 Apr	Nekton: Composition, Morphology, Populations	pp. 109-121, 187-200 *Film: "Ocean Drifters"*
M 29 Apr	Marine Mammals: Organisms and Adaptations	pp. 201-207, 207-219

			Film: "Science of Whales"
Tu	30 Apr	*Group Presentation Meeting* (*Writing assignment* due)	
W	1 May	Marine Mammal Acoustics	Reading TBA. *Peter Tyack TED Talk*
F	3 May	Deep Sea Environment and Adaptations	pp. 103-105, 471-480 *Film: "The Blue Planet: The Deep"*
S	4 May	Field trip to Woods Hole MA (Sat.-Sun.)	

Deep Sea Environments

M	6 May	Deep Sea Community Ecology: Hydro Thermal Vents (Kate Buckman, Ph.D., Dept. of Biological Sciences, Dartmouth)	pp. 480-487
Tu	7 May	Class discussion: *Overfishing*	*TBA*
W	8 May	**Hour Exam II**	

Tropical Marine Environments

F	10 May	Coral Reefs: Environment and Community Interactions	pp. 432-455 *Film: "Australia's Great Barrier Reef"*
M	13 May	Coral Reef Disturbance	TBA
Tu	14 May	Class discussion: *Overfishing*	*Film: "Empty Oceans, Empty Nets"*
W	15 May	Coral Reef Fisheries (Tyler Pavlowich)	

Human Impacts on Marine Systems

F	17 May	Fisheries Models and Management (Dr. Douglas Bolger, Environmental Studies Program)	TBA *Film: "The End of the Line"*
M	20 May	Mercury Pollution in the Marine Environment	pp. 564-581, C-MERC report
Tu	21 May	Plastics in the ocean	
W	22 May	Climate Change and the Oceans	pp. 32-37, 94, 529-560, 582-586
F	24 May	Carbon Sequestration and Iron Fertilization	
M	27 May	*Group Presentation*	
Tu	28 May	*Group Presentation*	
W	29 May	*Group Presentation*	

FINAL EXAM – Date and time to be announced