Biology 25: Marine Biology
Fall 2016
General Information

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

Graduate Teaching Assistant: Fiona V. Jevon, 1st floor lab, LSC
Fiona.V.Jevon.GR@dartmouth.edu

Schedule: Lecture MWF 11:30-12:35 (11-period)
X-period, Tuesday 12:15-1:05

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

Office hours: C. Chen: M 2:30-3:30, W 2:30-3:30 (also by appointment which are encouraged!)
F. Jevon: after class MWF (also by appointment)

Course purpose:
The overall objective of the course is to explore the amazing range of ecosystems in the world’s oceans and coastal areas, and to examine how abiotic (physical, chemical) and biotic factors (interactions with other living organisms) shape the ecological characteristics of organisms in these marine systems. We will also learn about the role of human interactions with these ecosystems and discuss some of the complexities of the current science/policy issues.

Required Books:
Textbook: Levinton, 2014, Marine Biology (paperback), Oxford University Press, 4th Revised International Edition. Reading assignments will be noted on each lecture outline. The pages listed in the attached syllabus 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.

X-period: X-Hours will be used for discussions of scientific papers and films.

Films: Films will be made available online so that you can view them at your leisure. For some topics, online video will also be assigned. Content of films and videos will be covered in exams.

Class Discussions: Class discussions will be held in a “jigsaw activity” format that will involve student “expert groups” that will focus on student becoming experts on individual papers (in the 1st discussion session). Members of those groups will present the content of their papers to other students in “mixed groups” and students will learn about a group of papers from their fellow students (in the 2nd discussion session). This format will facilitate small group learning and allow you to participate in informing your fellow students.
**Taxonomy Lab:** You will have one class period in the laboratory dissecting preserved samples of marine invertebrates and vertebrates. In this laboratory activity, you will learn the relationship of the anatomical features of each organism to their ecological function.

**Hourly Exams:** 2 hourly exams and a final exam (1st: 20%, 2nd: 25%, 3rd: 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).

**Field Trip:** Location Marine Biological Laboratory (MBL), Woods Hole MA, and Waquoit National Estuarine Research Reserve, Falmouth MA. Saturday to Sunday, September 24-25th (6AM on 24th) to (6PM on 25th). The field trip will have three components: 1) going out on the research vessel, the Gemma, to sample for marine organisms; 2) visiting the Marine Resources Center (at MBL) where marine organisms are cultured for ecological and biomedical research; 3) visiting the field study sites of the Waquoit National Estuarine Research Reserve at a nearby beach and on a local salt marsh. This trip is not required but those who cannot participate will have a separate assignment.

**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 a scientific proposal. The assignment will be due in the middle of the term and comprise 15% of the final grade.

**Required Reading:**
*American Catch, Paul Greenberg 2014*
This book will be the focus of a class discussion and a starting point for talking about the interaction between fisheries and marine ecosystems in the second half of the course. The book is about the history and current state of three different fisheries that were in the past sourced from coastal waters of the US but now are largely imported. The author discusses the links between our coastal waters and the ability of those waters to support fisheries that could provide seafood protein to the US. However, like many fisheries, the sources and customers are global as are impacts on the coastal environments on which they depend. We will have a class discussion on the science and the policy issues concerning these and other 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 of you 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 you to meet your commitments to your athletic teams, it is also your responsibility to meet your academic ones. When missing class for athletic events, it is highly recommended that you meet with me or the TA, Fiona Jevon, 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 http://writing-speech.dartmouth.edu/learning/materials/sources-and-citations-dartmouth. 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.

Technology Use: While use of laptops is permitted in class surfing the web is not. I strongly encourage you to refrain from engaging with technology in class unless it is related to course content. Web surfing and cell phone use is distracting to your classmates.
# Lecture Schedule

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<tr>
<th>Date</th>
<th>Topic</th>
<th>Assignment</th>
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<tr>
<td>M 12 Sep</td>
<td>Introduction to Marine Systems</td>
<td>pp. 1-12, 46-78, &quot;Poisoned Waters&quot; (Ches. Bay)</td>
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<td>Tu 13 Sep</td>
<td>&quot;Journey to the Ocean Floor&quot;</td>
<td>Paul Snelgrove TED talk</td>
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<td>W 14 Sep</td>
<td>The World Oceans: Geologic and Physical Environment</td>
<td>pp. 13-29</td>
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<td>F 16 Sep</td>
<td>Estuaries</td>
<td>pp. 349-355 &quot;Blue planet: Tidal Seas&quot;</td>
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<td>M 19 Sep</td>
<td>Rocky Intertidal – Habitat, Zonation, and Ecology</td>
<td>pp. 309-327, 246-252, &quot;Ocean Drifters&quot;</td>
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<td>Tu 20 Sep</td>
<td>Class discussion: Expert groups discuss their papers</td>
<td>Papers to be assigned</td>
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<tr>
<td>W 21 Sep</td>
<td>Soft Sediment Environ: Life habits and interactions</td>
<td>pp. 283-307, 327-335</td>
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<td>F 23 Sep</td>
<td>Salt Marsh Ecosystems</td>
<td>pp. 335-343</td>
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<td>S 24-25 Sep</td>
<td>Field trip to Woods Hole MA (Sat.-Sun.)</td>
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**Coastal Margins**

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<th>Date</th>
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<tr>
<td>Tu 27 Sep</td>
<td>Class discussion: Mixed groups share papers</td>
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<tr>
<td>W 26 Sep</td>
<td>Marine invertebrate Lab dissection (LSC 106)</td>
<td>Paper Assignment Discussion</td>
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<td>F 30 Sep</td>
<td>Presentation of Dissections</td>
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<td>M 3 Oct</td>
<td>Hour Exam I</td>
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<tr>
<td>Tu 4 Oct</td>
<td>Class discussion: Expert groups discuss their papers</td>
<td>Papers TBA</td>
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<td>W 5 Oct</td>
<td>Zooplankton Communities</td>
<td>pp. 145-161, 220-222</td>
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<td>F 7 Oct</td>
<td>Planktonic Food Webs and the Microbial Loop</td>
<td>pp. 219-220</td>
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<td>M 10 Oct</td>
<td>Nekton: Composition, Morphology, Populations</td>
<td>pp. 165-177 &quot;Ocean Drifters&quot;</td>
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<td>Tu 11 Oct</td>
<td>Class discussion: Mixed groups share papers</td>
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Monday, September 12, 2016

Marine Biology and Ecology

W 12 Oct  Marine Mammals: Organisms and Adaptations  pp. 177-185, 482-484
  Film: "Science of Whales"
F 14 Oct  Marine Mammal Acoustics  Reading TBA
          Peter Tyack TED talk
M 17 Oct  Discussion of “American Catch”
Tu 18 Oct  Fisheries Group Meeting  (Writing assignment due)
W 19 Oct  Ecology of Polar Marine Ecosystems  pp. 428-432
          (Fiona Jevon, EEEB Graduate Program)

Deep Sea Environments
M 24 Oct  Hydro Thermal Vents (Kate Buckman, Ph.D., Dept. of Biological Sciences)  "The Blue Planet: The Deep"
Tu 25 Oct  Class discussion: Expert groups discuss papers  Papers TBA
W 26 Oct  Hour Exam II

Tropical Marine Environments
          Film: “Blue Planet: Coral Seas”
M 31 Oct  Coral Reef Disturbance  TBA
Tu 1 Nov  Class discussion: Mixed groups share papers

Human Impacts on Marine Systems
W 2 Nov  Tale of Two Oil Spills: Exxon and BP  pp. 492-507
          “After the Spill”
F 4 Nov  Fisheries Models and Management  pp. 461-482
          “Empty Oceans Empty Nets”
M 7 Nov  Harmful algal blooms  pp. 215-216, 508-512
Tu 8 Nov  Climate Change: Carbon Sequestration in the Oceans  pp. 513-515
W 9 Nov  Mercury Pollution in the Marine Environment  “Sources to Seafood”
F 11 Nov  Group Presentation
M 14 Nov  Group Presentation
Tu 15 Nov  Group Presentation
W 16 Nov  Group Presentation

FINAL EXAM – Date and time to be announced