

**Dynamics of Marine Ecosystems:  
Biological-Physical Interactions in the Oceans (OCN 480/680)  
Spring 2008**

**Instructor:**

Dr. Margaret Anne McManus  
Marine Sciences Building  
mamc@hawaii.edu  
(Office hours by appointment)

**Class Time:**

Tuesdays and Thursdays 12:00-1:15

**Class Location:**

MSB 307

**Readings:**

Dynamics of Marine Ecosystems: Biological-Physical Interactions in the Oceans. 2005. Mann KH and Lazier JRN. Blackwell Scientific Publications.

Journal Articles

**Mid-Term Exam:**

Thursday Feb 28

**Final Exam:**

Thursday May 15

**Homework:**

Please pay attention to the syllabus. (1) If we are going to have a lecture on a chapter, read the chapter before class. (2) If we are going to have a lecture on a journal article, read the journal article before class. (3) If you are going to present a journal article, please come to class prepared to lecture.

**Class Schedule:**

<b>Date</b>	<b>Activity</b>	<b>Ch</b>	<b>Topic</b>
Jan 15	Lecture	1	Introductions Overview of syllabus, readings & project
Jan 17	Lecture	2	Biology and Boundary Layers I Phytoplankton
Jan 22	Journal Article		Berdalet, E. and Estrada, M.: Effects of small-scale turbulence on the physiological functioning of marine algae, in: Algal Cultures, Analogues of Blooms and Applications, edited by: Subba Rao, D. V., Enfield, NH, USA, Science Publishers, Inc., 2005.
Jan 24	Lecture	2	Biology and Boundary Layers II Zooplankton

Jan 29	Lecture		Woodson CB, DR Webster, MJ Weissburg and J. Yen. 2005. Response of copepods to physical gradients associated with structure in the ocean. <i>Limnol. Oceanogr.</i> 50(5) 1552-1564.
Feb 5	Lecture	3	Vertical Structure of the Open Ocean: Biology of the Mixed Layer
Feb 7	Journal Article		Sverdrup HU. 1953. On Conditions for the Vernal Blooming of Phytoplankton. <i>J. Cons. Perm. Int. Exp. Mer.</i> 18: 287-295.
Feb 12	Lecture	4	Vertical Structure in Coastal Waters: Freshwater Run-off and Tidal Mixing
Feb 19	Lecture		Vertical Structure in Coastal Waters: (Continued)
Feb 21	Lecture		Vertical Structure in Coastal Waters
Feb 26	Journal Article		Graham WM and JL Largier. 2007. Upwelling shadows as nearshore retention sites: the example of northern Monterey Bay. <i>Continental Shelf Research.</i> Vol 17(5) 509-532.
<b>Feb 28</b>	<b>Mid Term</b>		<b>MID TERM</b>
March 4	No class		Ocean Sciences
March 6	No class		Ocean Sciences
Mar 11	Lecture		Fronts in Coastal Waters PISCO 2007 Experiment
Mar 13	Journal Article		Pingree RD, PR Pugh, PM Holligan and GR Forster. 1975. Summer phytoplankton blooms and red tides along tidal fronts in the approaches to the English Channel. <i>Nature</i> Vol 258: 672-677.
Mar 18	Journal Article		Dekshenieks MM, PL Donaghay, JM Sullivan, JEB Rines, TR Osborn and MS Twardowski. 2001. Temporal and spatial occurrence of thin phytoplankton layers in relation to physical processes. <i>Marine Ecology Progress Series.</i> 223: 61-71  McManus MA, RM Kudela, MW Silver, GF Steward, PL Donaghay, JM Sullivan. 2008. Cryptic blooms: Are thin layers the missing connection? <i>Estuaries and Coasts.</i> In press.
Mar 20	Lecture	7	Tides, Tidal Mixing and Internal Waves
Mar 25	No class		Spring Break
Mar 27	No class		Spring Break
Apr 1	Journal Article		McManus MA, OM Cheriton, PT Drake, DV Holliday, CD Storlazzi, PL Donaghay and CE Greenlaw. 2005. The effects of physical processes on the structure and transport of thin zooplankton layers in the coastal ocean. <i>Marine Ecology Progress Ser.</i> 301: 199-215.
Apr 3	Journal Article		Pineda J. 1999. Circulation and larval distribution in internal tidal bore warm fronts. <i>Limnology and Oceanogr.</i> 44(6): 1400-1414.

Apr 8	Lecture	8	Ocean Basin Circulation: The Biology of Major Currents, Gyres, Rings and Eddies
Apr 10	Lecture		Eddy studies & Optics in Oceanography
April 15	Lecture		Influence of a cyclonic eddy on microheterotroph biomass and carbon export in the lee of Hawaii
Apr 17	Lecture	9	Variability in Ocean circulation: Its Biological Consequences
Apr 22	Lecture		The Transition Zone chlorophyll front, a dynamic global feature defining migration and forage habitat for marine resources
Apr 24	Journal Article		Pfeiffer-Herbert AS, MA McManus, PT Raimondi, Y Chao and F Chai. 2007. Dispersal of barnacle larvae along the central California coast: A modeling study. <i>Limnology and Oceanography</i>
Apr 29	Lecture	10	The Oceans and Global Climate Change: Physical and Biological Aspects
May 6	Journal Article & Lecture	11	Barth JA, BA Menge, J Lubchenco, F Chan, JM Bane, AR Kirincich, MA McManus, KJ Nielson, SD Pierce and L Washburn. 2007. Delayed upwelling alters coastal ocean ecosystems in the northern California current. <i>Proceedings of the National Academy of Sciences</i> . In press Questions for the future
<b>May 15</b>	<b>Exam</b>		<b>12:00-2:00 PM</b>

### Distinguished Guest Lecturers

Dr. C Brock Woodson	Research Scientist, Department of Oceanography, University of Hawaii
Dr. Carrie Leonard	Optical Oceanographer, BAE Systems
Dr. Bob Bidigare	Professor of Oceanography, HIMB, University of Hawaii
Dr. Jeff Polovina	Acting Director, Pacific Islands Fisheries Science Center

### Student Learning Outcomes

1. Students will be able to explain the major processes influencing the circulation patterns in a variety of coastal areas.
2. Students will be able to explain how coastal physical oceanographic processes affect the marine ecosystem.
3. Students will be able to present information about coastal physical oceanography and marine ecosystems in both oral (undergraduate and graduate students) and written reports (graduate students) clearly.