

MARINE ECOLOGY

Biology 313 Fall 2005

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Lecture: Tuesday/Thursday 0930-1050, Carnegie 429
Lab: Tue. 1300-? (and as scheduled), Carnegie 444

Course Description

This course provides a rigorous examination of the ecology of marine and brackish water systems based on the principles of population biology and community ecology. The course begins with an overview of oceanography, ecology, and larval biology as background for the remainder of the course. We will then study the ecology of the major marine communities: intertidal and subtidal hard substrate, kelp, soft substrate, estuarine, plankton, coral reef, and deep sea. Throughout the semester, emphasis is placed on current hypotheses concerning the processes controlling the distribution and abundance of organisms in these communities and written and oral critical evaluation of the primary scientific literature. Laboratories are designed to demonstrate some of the principles discussed in class and to provide an opportunity to collect, analyze, interpret and report on scientific data. The last half of the course you will be conducting your own independent project in laboratory.

Reading:

Required

Nybakken, J.W. 2001. *Marine Biology an Ecological Approach* 6th Edition, Harper Collins College Publishers

Readings from the primary literature in lab (Carnegie 444)-honour system.

Optional (on 2-hr. reserve in Ladd Library)

Bertness, M.D. 1999. *The Ecology of Atlantic Shorelines*. Sinauer Associates, Inc. 417 pp.- on 2 hr. reserve in Ladd Library.

Bertness, M.D., S.D. Gaines, M.E. Hay (eds.) 2001. *Marine Community Ecology* Sinauer Associates, Inc. 550 pp.

Day, RA 1998. *How to Write and Publish a Scientific Paper*, 5th ed. Oryx Press. 223 pp.

Class will focus on the discussion of articles, so it is essential that you do the reading faithfully and prior to coming to class. Each class, one of you will be asked to provide an introduction to one of the papers we will discuss.

Grading:

There are no exams in this class. Grades are based on written work (biweekly papers, final paper, and lab reports) and class and lab participation.

Biweekly papers (4)	30%
Final paper	12%
Class and Lab Participation	10%
Lab Reports (2)	48%

Papers: Approximately, every other week you will write a 2-page paper on a topic selected by me. These papers are due in class on Thursday (except during the week of fall break when they are due on Tuesday). Papers **must** be submitted as hard copy and as an electronic copy as a word attachment to an e-mail. The text of these papers **must not** exceed **2 pages**. References, figures, and diagrams are not included in the 2- page limit. The final paper can be on a topic of your choosing and **may not exceed 5 pages** in length. I will not accept papers that exceed these length limits nor will I accept late papers.

Office Hours: I have no official office hours. My office is always open and I am generally available for students anytime I am on campus from **Monday-Thursday**. It is best to make an appointment if you want to be sure to see me. Please do not try and meet with me the hour or so before class. I reserve Fridays for my thesis students. I am most easily reached by e-mail, but do not expect an immediate response.

Communication: The easiest way to reach me may be by e-mail (wambrose). If you want to address your question to the entire class, use the class list serve (Fbio313a). I will use the list serve to get messages to you between classes, so it is your responsibility to check e-mail. You may want to use it to set up study groups etc. Be aware that if you respond to a message on the list serve, everyone will see it.

LECTURE SCHEDULE
(subject to change)

Date	Topic	Reading
<u>Week 1</u>		
Tue. 6 Sept.	Course Introduction Oceanography for Marine Ecologists Slides	Ch 1(1-19; 31-41)
Thur. 8 Sept.	Ecological Principles Structure of Marine Communities	Ch 1 (19-25) Buss 1979 Peterson 1977 Peterson & Black 1988
<u>Week 2</u>		
Tue. 13 Sept.	Larval Ecology	Ch 1 (25-31) Farrell <i>et al.</i> 1991 Grosberg 1981 Harrington <i>et al.</i> 2004 Pawlick <i>et al.</i> 1991
Thur. 15 Sept.	Rocky Intertidal I: Competition	Ch 6 (266-308) Jenkins <i>et al.</i> 1999 Paine 1966; Lubchenco 1978
<u>Week 3</u>		
Tue. 20 Sept.	Rocky Intertidal II: Disturbance and larval supply PAPER #1 DUE	Bertness <i>et al.</i> 2004a Gaines <i>et al.</i> 1995 Kim & de Wreede 1996
Thur. 22 Sept.	Rocky Intertidal III: Bottom-up Organization	Menge <i>et al.</i> 1997 Menge 2000

Date	Topic	Reading
<u>Week 4</u>		
Tue. 27 Sept.	Rocky Subtidal: networks Rock Intertidal: multiple stable states	Ch 5 (214-221); Sutherland 1974 Bertness <i>et al.</i> 2004b Connell & Sousa 1983 Petraitis <i>et al.</i> 2003 Petraitis & Dudgeon 2004
Thur. 29 Sept	Kelp Beds: Sea otters and urchins	Ch 5 (221-233) Estes <i>et al.</i> 1998 Simenstad <i>et al.</i> 1978
<u>Week 5</u>		
Tue. 4 Oct.	Grassbeds PAPER #2 DUE	Ch 5 (233-241) Fonseca & Bell. 1998 Irlandi & Peterson 1991 Peterson 1986 Summerson & Peterson 1984
Thur.. 6 Oct.	Estuaries: Productivity	Ch 8 (361-381) Haines 1977 McMahon <i>et al.</i> 2006 Wolver and Spurrier 1988
<u>Week 6</u>		
Tue 11 Oct.	Estuaries: Salt Marshes	Ch 8 (381-406) Bertness 1991 Silliman & Zieman 2001
Thur. 13 Oct.	Soft-substrate I: Physical and Biological Factors	Ch 6 (308-341) Rhodes & Young 1970 Woodin 1985
<u>Week 7</u>		
Tue. 18 Oct.	Soft-substrate II: Top-down and bottom-up organization PAPER # 3 DUE	Ambrose 1984 Beukema <i>et al.</i> 2002 Posey <i>et al.</i> 1995 Virnstein 1977
Thur. 20 Oct.	FALL BREAK	

Date	Topic	Reading
<u>Week 8</u>		
Tue. 25 Oct.	Plankton I: 1° Productivity & Food Chain Structure	Ch 2 Azam 1998 Blackburn <i>et al.</i> 1998 Martin <i>et al.</i> 1994 Ryther & Sanders 1980 Strom <i>et al.</i> 2001
Thur. 27 Oct.	Plankton II: Long-Term Change	Boyd <i>et al.</i> 2001 Edwards & Richardson 2004 Gregg <i>et al.</i> 2005 Karl <i>et al.</i> 2001
<u>Week 9</u>		
Tue. 1 Nov.	Plankton III: Predator Control PAPER # 4 DUE	Fulton 1984 Pauly & Christensen 1995
Thur. 3 Nov.	Pelagic-Benthic Coupling	Ambrose & Renaud 1995 Witbbard <i>et al.</i> 2000 Graf 1989 Smith <i>et al.</i> 1999
<u>Week 10</u>		
Tue 8 Nov.	Coral Reef I: Coral-coral interaction	Ch 9 (407-436) Chornesky 1989 Jackson 1991 Maida <i>et al.</i> 1995
Thur. 10 Nov.	Coral Reefs II: Bleaching and Fishes	Ch 9 (436-453) Almany & Webster 2004 Aronson <i>et al.</i> 2002 Doherty & Fowler 1994 Gardner <i>et al.</i> 2005 Hay & Taylor 1985 Munday, P.L. 2004
<u>Week 11</u>		
Tue. 15 Nov.	Deep Sea I: Diversity	Ch 4 Gray 1994 Gray 2002 Poore & Wilson 1993 Snelgrove <i>et al.</i> 1992
Tue. 17 Nov.	Hydrothermal Vents FINAL PAPER DUE	Marsh <i>et al.</i> 2001 Smith <i>et al.</i> 1989 Tunnicliffe 1992

Date	Topic	Reading
<u>Week 12</u>	THANKSGIVING BREAK	
<u>Week 13</u>		
Tue. 29 Nov.	Fisheries I: Patterns	Ch 11 (500-520) Botsford <i>et al.</i> 1997 Steele & Hoagland 2003
Thur. 1Dec.	Fisheries II: Consequences & Solutions	Auster <i>et al.</i> 1996 Frid <i>et al.</i> 1999 Jackson <i>et al.</i> 2001
<u>Week 14</u>		
6 Dec.	Marine Reserves	Byers 2005 McNeill & Fairweather 1993

LABORATORY SCHEDULE

(subject to change¹)

The purpose of the laboratories is to introduce you to local marine communities, to allow you to observe some of the patterns of species distribution and abundance, and to test some of the principles discussed in class. The laboratories are also designed to expose you to some of the methods (field, laboratory, and statistical) used in marine ecology and to give you the opportunity to develop your skills in scientific writing and critical analysis.

Many labs are dependent on low tides, and will therefore sometimes begin earlier and will almost always run later than scheduled. We will rarely return from field work before 1630 (4:30pm) and often we will be much later. Students who anticipate difficulties with scheduling should see me as soon as possible.

Labs will run as scheduled regardless of weather unless the conditions are hazardous. Dress appropriately. Be prepared to get wet and cold. Wear waterproof foot ware (we have some wet suit booties and rubber boots you can borrow) and bring a hat, gloves, and a change of clothes.

The results of 1 laboratory must be reported in the form of a scientific paper and is due 25 October. The latter part of the semester is devoted to an independent project and a scientific-format report due 2 December. Your independent project may be an expansion, with significantly more data collection and a slightly different question, of a lab we have done. You may also choose your own research question. Statistical analysis beyond what we do in the formal laboratory period will be necessary for the lab your chose to write and for your independent project. .

Date	Lab	Reading
<u>Week 1</u>	Orientation	
<u>Week 2</u>		
Tue. 13 Sept.	Tide Pool Structure (L: 1252, 1.4 ft.): Giant Stairs	Kim & de Wreede 1996 Methratta, 2004 Metaxas <i>et al.</i> 1994 Trussell <i>et al.</i> 2004
<u>Week 3</u>		
Tue. 20 Sept.	Tide Pool Data Analysis	
<u>Week 4</u>		
Tue. 27 Sept.	Salt Marsh Food Web (L: 1331, 2.1 ft.)	Schindler & Lubetkin 2004 Riera <i>et al.</i> 1999 Hampel <i>et al.</i> 2005
<u>Week 5</u>		
Tue. 4 Oct.	Food Wed analysis	
<u>Week 6</u>		
Tue. 11 Oct.	Remineralization (L: 1133, 1.5 ft.)	Ståhl, H. <i>et al.</i> 2004
<u>Week 7</u>		
Tue 18. Oct.	Remineralization Analysis Project Outline Due Oral Presentation of Project Proposal	

Date	Lab	Reading
<u>Week 8</u>		
Tue. 25 Oct.	Grassbed (L; 1150, 2.3 ft.) Lab # 1 Due	Mattila <i>et al.</i> 1999 Williams & Heck 2001
<u>Week 9</u>		
Tue. 1 Nov	Project work: field (L: 1624, 0 ft.)	
<u>Week 10</u>		
Tue. 8 Nov.	Project Work: field (L: 0917, 1.3 ft.)	
<u>Week 11</u>		
Tue. 15 Nov.	Project Work (L: 1626, -1.0 ft.)	
<u>Week 12</u>		
Tue. 22 Nov.	THANKSGIVING BREAK	
<u>Week 13</u>		
Tue 29 Nov.	Presentations	
<u>Week 14</u>		
Tue 6 Dec.	Presentations	
Thur 9 Dec.	Project Due	

¹ Lecture and Laboratory schedules are subject to change. Changes will be announced in class or on the class e-mail list. It is your responsibility to keep informed.