

BIOE 120: Marine Botany, Spring 2015

Tuesday/Thursday 10-11:45 COH 118

INSTRUCTOR:

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OFFICE HOURS:

Tues 11:45-12:45
Thur 9:15-10

WEBSITE:

<http://bio.classes.ucsc.edu/bioe120>
<http://www.algaebase.org>

GOALS OF THE COURSE:

1. To understand the main patterns of algal evolution. This course makes no attempt to cover all the algal phyla and classes; instead, we will focus almost entirely on the ecology and evolution of the three main divisions of marine macroalgae: chlorophyta, ochrophyta, & rhodophyta. We will also explore phytoplankton, marine angiosperms and coastal species such as mangrove and salt marsh species.
2. To achieve a basic level of competence in identifying marine algae. This will require you to know the basic patterns of morphology, development and reproduction that characterize the different algal taxa. You should also become familiar with the more common species found locally.
3. To understand the particular constraints and stresses associated with being a photosynthetic organism living in the ocean and to understand the factors that influence species diversity and abundance in marine communities.
4. To improve your scientific reading skills and to present a scientific paper.

TEXTBOOK/READING ASSIGNMENTS: The only required text is *Marine Algae of California*, Abbott and Hollenberg (1976). If you are interested in pursuing a career in marine biology, or know that you learn best through reading. I recommend that you purchase *Seaweed Ecology & Physiology* 2nd edition by Hurd (2014), *Algae: Anatomy, Biochemistry & Biotechnology* 2nd Edition by Barsanti & Gualteiri 2014, *Algae 2nd edition*, by Graham, Graham and Wilcox, 2008 or *Marine Botany* by Dawes (1998). The rest of the reading material for the course consists of research articles, and will be made available to you as PDFs you can download from the course website.

Lecture Grading:

Midterm:	25%
Final:	25%
Herbarium:	25%
Presentations:	15%
Paper Discussion:	5%
Class Participation	5%

Lab Grading

Practical 1 -	25%
Practical 2 -	25%
Notebook -	50%

Attendance: Attendance to class and lab are mandatory, unless you are sick or have some other family obligation. I will be sending around an attendance sheet in class and your attendance will affect your class participation grade. You can make up one lab without a penalty. If you miss two labs, you can make up the second lab but will be penalized 10 points. If you miss three labs you will receive a zero credit for the third lab.

Presentations: You will work in **pairs** and develop a 7-9 minute power point presentation that you will present to the class at the end of the quarter. You will choose a scientific paper from the primary literature to present to the class. A list of papers will be posted on the class website or you can choose a paper dealing with any topic in Marine Botany, such as ecology, genetics or taxonomy. This paper cannot be one assigned to the class or presented as an example in class. **You will need to send me an electronic copy of the paper for approval.** Papers will be taken on a first come first serve basis. Once a group has picked a paper and it is posted on the website it will not be available for any other group to use.

Exams: The exam questions will be based on material presented in the lectures and from the assigned primary literature readings. There will be two exams during the course, a midterm and a final. The midterm will cover material presented in the first half of the class. The final will cover material presented throughout the entire course (i.e. comprehensive final) but will focus primarily on material from the second half of the quarter.

Field Trips:

There will be three one-day field trips to the intertidal to collect algae for your herbariums. We will explore the intertidal and collect algae during the low tides. This is a great opportunity to learn the names and zonation patterns of common intertidal algae. We will then return to the lab and key out the algae collected. These field trips are optional because they are held on the weekends. Extra algae collected on field trips will be put in the lab if you cannot come on any of the field trips or you will need to go to collect algae on your own time and will need to purchase a fishing license to do this collecting legally.

Herbarium Assignment:

You will be expected to make 13 algal pressings during the course of the class. Your herbarium will be due on the last day of lab, **Friday, June 5th**. You will need to collect **3 species** of chlorophyta, **5 species** of phaeophyceae and **5 species** of rhodophyta. We want your herbarium to contain a diverse group of algae. To insure this is the case, you will be limited to collect **only one species per order unless indicated**. **Labels must include updated name from algae base: <http://www.algaebase.org>**

TENTATIVE LECTURE/LAB SCHEDULE:

Week	Date	Day	Lab / Lec	Topic
1	31-Mar	Tue	Lecture	What ARE Algae? Into to taxonomy & phylogeny
	2-Apr	Thur	Lecture	Physiology
	2/3-Apr	TH/F	Lab	Introductory Lab (Part 1)-Methods
2	7-Apr	Tue	Lecture	Ecology
	9-Apr	Thur	Lecture	Morphology
	9/10-Apr	TH/F	Lab	Introductory Lab (Part 2)-Morphology
sun	12-Apr	Sun	Field Trip Davenport Landing	Meet @LML 9:30 am
3	14-Apr	Tue	Lecture	Chlorophyta I
	16-Apr	Thur	Lecture	Chlorophyta II
	16/17-Apr	TH/F	Lab	Chlorophyta
4	21-Apr	Tue	Lecture	Ochrophyta I
	23-Apr	Thur	Lecture	Ochrophyta II
	23/24-Apr	TH/F	Lab	Phaeophyceae I
sat	25-Apr	Sat	Field Trip Pigeon Pt	Meet @ LML 8:30 am
5	28-Apr	Tue	Lecture	Midterm Exam
	30-Apr	Thur	Lecture	Guest Lecture: Kelps
	30/1-May	TH/F	Lab	Phaeophyceae II
6	5-May	Tue	Lecture	Rhodophyta I
	7-May	Thur	Lecture	Rhodophyta II
	7/8-May	TH/F	Lab	Practical I (notebooks due)
sat	9-May	Sat	Field Trip Davenport Landing	Meet @ LML 8:00 am
7	12-May	Tue	Lecture	Biogeography
	14-May	Thur	Lecture	Saltmarshes, Seagrass
	14/15-May	TH/F	Lab	Rhodophyta I
8	19-May	Tue	Lecture	Mangroves
	21-May	Thur	Lecture	Cyanophyta
	21/22-May	TH/F	Lab	Rhodophyta II
9	26-May	Tue	Lecture	Phytoplankton
	28-May	Thur	Lecture	Student Presentations
	28/29-May	TH/F	Lab	Cyanophyta/ Phytoplankton
10	2-Jun	Tue	Lecture	Student Presentations
	4-Jun	Thur	Lecture	Student Presentations
	4/5-Jun	TH/F	Lab	Practical II(notebooks and pressings due)
11	11-Jun	Thur	8-11 am	Final Exam

Paper Discussions: We will have paper discussions during the last 15-20 minutes of class. You will help lead one of these paper discussions. Depending on class size 5-6 people will be in charge of leading the paper discussion. As the discussion leaders your assignment is to give a quick summary of the important aspects of the paper, help clarify or high light important graphs, and ask questions to help us to better understand the paper. The papers can be found on the course website.

- April 2:** Lubchenco and Cubitt. 1980. Heteromorphic life histories of certain marine algae as adaptations to variations in herbivory. *Ecology* 61(3): 676-687
- April 7:** Saffo. 1987. New light on seaweeds. *Bioscience*. 37 (9). 654-664
- April 9:** Sousa, 1979. Disturbance in marine intertidal boulder fields: the nonequilibrium maintenance of species diversity. *Ecology*. 60 (6). 1225-1239
- April 14:** Williams and Schroeder. 2004. Eradication of the invasive seaweed *Caulerpa taxifolia* by chlorine bleach. *MEPS*. 272: 69-76
- April 16:** Clifton and Clifton. 1999. The phenology of sexual reproduction by green algae (Bryopsidales) on Caribbean coral reefs. *Journal of Phycology*. 35: 24-35
- April 21:** Hays 2007. Adaptive phenotypic differentiation across the intertidal gradient in the alga *Silvetia compressa*. *Ecology* 88:149-157.
- April 23:** Hughes. 2010. Variable effects of a kelp foundation species on rocky intertidal diversity interaction in central California. *Journal of experimental Marine Biology and Ecology* 393:90-99
- April 30:** Graham et al. 2007. Deep-water kelp refugia as potential hotspots of tropical marine diversity and productivity. *PNAS*. 104 (42): 16576-16580
- May 5:** Searles. 1980. The strategy of the red algal life history. *American Naturalist*. 115 (1): 113-120
- May 7:** Thornber, Stachowicz and Gaines. 2006. Tissue type matters: selective herbivory on different life history stages of an isomorphic alga. *Ecology*. 87(9) 2255-2263
- May 12:** Littler and Littler. 1980 The evolution of thallus form and survival strategies in benthic marine Macroalgae: field and laboratory tests of a functional form. *The American Naturalist* 116(1) 25-44.
- May 14:** Waycott, M. et al. 2009 Accelerating loss of seagrasses across the globe threatens coastal ecosystems. *PNAS*. 106 (30): 12377-12381
- May 19:** Kuffner, I.B. 2008. Decreased abundance of crustose coralline algae due to ocean acidification. *Nature*. 1:114-117
- May 21:** Capone, D. G. et al. 1997. *Trichodesmium*, a globally significant marine cyanobacteria. *Science* 276: 1221-1229.
- May 26:** Shi et al. 2010 Effect of ocean acidification on iron availability to marine phytoplankton. *Science* 327:676-679.

Marine botany. Quite the same Wikipedia. Just better. Marine botany. From Wikipedia, the free encyclopedia. TEDxPetalingStreet2015 Gan Ming Herng Teaser Ad. Transcription. Marine ecology. Marine ecology and marine botany include: Benthic zone. Coral reef.