

## BI 410/510 TROPICAL MARINE ECOLOGY – FALL 2016

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Office Hours 9-11, Monday, and by appointment

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The tropical marine environment includes some of the most spectacular, diverse, and threatened marine ecosystems on Earth. This class is intended to provide advanced understanding of the structure and function of coral reef ecosystems and the biology of the major reef builders and eroders – plus a few of the just plain ‘cool’ animals you will find on reefs and adjacent ecosystems. Climate change, including increased water temperatures and ocean acidification – along with tremendous human activity on the coasts of tropical nations – represent major stressors through processes like increased siltation, eutrophication, ocean acidification, sea level rise, and thermal stress. These topics will be explored at an advanced level using online resources and primary and secondary literature.

### Learning Objectives

Students successfully completing this course will be able to:

- 1) Describe patterns of marine ecology associated with latitude, and reasons that latitude can (and cannot) be used to predict the impact of global change or the distribution of tropical species.
- 2) Locate and explain major bio-regions of the tropics, explain what is meant by “Tropics” and “Tropical”, and defend (or critique) various theories intended to explain patterns of marine biodiversity throughout the tropics.
- 3) Compare and contrast patterns of biodiversity and vulnerability to modern stressors in tropical environments associated with different biogeographical and geopolitical regions. Be able to explain and critique hypotheses that purport to explain these patterns and to offer some examples of approaches to sustainability that are being developed around the world.
- 4) Demonstrate an understanding of the physiology of coral bleaching, the nature of the coral/zooxanthellae symbiosis, the spread of disease in tropical marine environments, the role of currents and connectivity in maintaining tropical marine ecosystems, and proposed methods of monitoring and predicting the health of coral reefs and other marine ecosystems by being able to interpret scientific literature on these topics.
- 5) Utilize data from IPCC and NRC reports, earth observing systems like Coral Reef Watch, and other sources to explain why climate science is an evolving field and how ocean acidification and sea level rise are affecting tropical marine ecosystems using specific examples.
- 6) Communicate information about the importance of healthy tropical ecosystems to a general audience, using examples and data to show the importance of biology to a modern society.
- 7) Interpret and analyze scientific literature, including graphical information – using both written and oral communication effectively.

- 8) Demonstrate an ability to read using a constructively critical and skeptical approach by being able to write professional-level peer reviews.
- 9) Articulate an understanding of how science and scientific careers progress by reflecting on how your idea about your own future has changed over the term.

TEXTBOOKS – Resources to help understand and enrich lectures and to help with assignments and projects

- 1) *The Biology of Coral Reefs*, C. R.C. Sheppard, S.K. Davy, and G. M. Pilling – Oxford Univ. Press, **UO Bookstore**
- 2) *Tropical Connections*, W. L. Kruczynski and P. J. Fletcher, IAN Press – Chs. 4,5,6 and a small bit of Ch. 7
  - a. Available as e-chapters from [www.ian.umces.edu](http://www.ian.umces.edu)
  - b. Available as a whole e-book from IAN Press
  - c. Available for order a print book on Amazon and from IAN press
- 3) SimUText: Climate Change Modeling. You can purchase directly online from SimUlink (info to be provided) or from the bookstore. If you purchase from the bookstore, you will get a voucher with a number you will use to access the online content.

RECOMMENDED:

- 1) *Science of Marine Reserves*, Caribbean and Latin America – PISCO brochure (pdf on Blackboard)
- 2) *Ocean Acidification*, A National Strategy to Meet the Challenges of a Changing Ocean
  - a. Available as a free download at <http://www.nap.edu/catalog/12904/ocean-acidification-a-national-strategy-to-meet-the-challenges-of>

OTHER READINGS WILL BE ASSIGNED DURING THE TERM AS INDICATED ON COURSE SCHEDULE

Bi 410 PROJECTS – Tropical Marine Ecology is a very exciting and rapidly developing field, just like the nations that support tropical marine ecosystems and depend on them for food and other forms of security. Ten weeks does not allow us to investigate many specific or individual topics in much detail. Thus, working in teams of 2-4 people, students will choose a topic to develop for presentation to the class in both oral and written form. Grading on this project will be based on the written component, which will require some individual input from each member of the group, an oral presentation in which all group members should participate, and individual student reflection on the presentation of others. More details on possible topics and the structure of this assignment will be given in class. We will begin group projects in the first Discussion section.

**BI510 PROJECT** – At the University of Oregon, students in the graduate section of a course are expected to do substantially more work, and at a higher level than students enrolled in the graduate section. Students enrolled in BI510 will do all work required for BI410 (except the 410 Project). Additionally, they will do a project that complements their research and professional goals. This will include an annotated bibliography, oral presentation, and other document (grant proposal, project proposal, white paper, etc.). Individual projects will be developed in consultation with me in the first few weeks of the term. A preliminary annotated bibliography with at least 15 entries, including at least two each of websites, papers from the primary literature, monographs, and news items will be due from students in BI510 by Monday of Week 5.

**CLASS ENVIRONMENT, STANDARDS, AND RESPECTFULNESS** - As an upper-division course, I have high expectations for performance and your commitment to ‘stretching’ – seeking deeper learning, more creative exploration, and greater mastery of concepts than ever before. Students are expected to be prepared for discussions and to make an effort to ensure that all people in the class have an opportunity to be heard and to learn. Electronics should be muted, and used only to enhance the learning environment and class process. People with different backgrounds bring a lot of different kinds of wisdom – please share yours and listen for others’.

Regarding communication -- I am available almost all the time by email and will try to answer email as soon as I can (usually within 4 hours unless it arrives after 8 PM at night). I actually love email dialog and am often online at night, so do not worry about writing in the evening. I am also happy to review work you are planning to hand in and talk about how it could be made better and brought to an even higher standard than you have already achieved when we meet in my office or online.

Grading and Academic Integrity -- Work is expected to be completed to a high standard and to be on time. Group work requires careful attention to shared credit and all students are expected to be familiar with and follow UO policies on plagiarism and other forms of academic dishonesty.

Grading – Basically on a 100-point scale. Material that is turned in late will be seriously penalized as, in nearly all cases, the material you are turning in is also the basis for class discussion, minimum 2% deduction for late or incomplete assignments.

Reviews - 25 pts. (Weighted, final review worth 15 pts.)

Project – 20

Climate Change Unit – 15

Mid-term - 15 pts.

Final – 15 pts.

Participation – 15 (attendance, worksheets, and on-time completion of reviews and accompanying questions; excused absence from either of the two special seminars must be arranged in advance)

## TROPICAL MARINE ECOLOGY - FALL 2016 - SCHEDULE

WEEK	TOPIC	
Week 1		
Tues 9/27	Intro to Tropics and Tropical Marine Biology	
Thurs 9/29	The Big Three: Overview of Mangroves, Reefs, and Seagrass Beds	
	READINGS: <i>Tropical Nature</i> , Chs. 4,5, & 6; Beget et al. 2013	
	Wilkinson & Salvat 2012; Burkholder et al. 2013 (write review for 10/6)	
Week 2		
Discussion	Biogeography of the tropics	READINGS: Sheppard et al., Ch. 1, 9, 10
Tues 10/4	Biogeography presentations	
TH 10/6	Discuss Week 1 Readings and Reviews	Review 1 Due, Review 2 Assigned
Week 3		
Discussion	Intro to coral form and function	Turn in project ideas
Tues 10/11	Reef Builders and Environment	Organize groups
Th 10/13	Corals and Symbiosis	Review 2 Due
Week 4		
Discussion	Special Seminar at 1PM, 110 Willamette	2 annotation entries per member due online
Tues 10/18	Dr. Virginia Weiss, Visiting Speaker - CNIDARIAN SYMBIOSES	
Th 10/20	Other benthic reef organisms	Mid-term distributed
Week 5		
Discussion	Discuss Von Hooidonk - Start Bleaching and Climate Change Exercise	
Tues 10/25	Bleaching and OA Research	
Th 10/27	Disease in reefs	Mid-Term due, Review 3 assigned
Week 6		
Discussion	Tropical plankton	Turn in ideas for your project
Tues 11/1	Reproductive Cycles and Circulation	Organize groups
Th 11/3	Rising water and impact	Review 3 Due
Week 7		
Discussion	Climate change & bleaching exercise due - discuss papers and exercise	
Tue 11/8	Seabirds and Island loss	
Th 11/10	Sea Grass Beds, and CO2 seeps	Review 4 Due, Review 5 Assigned
Week 8		
Discussion	Special Seminar at 1PM	
Tues 11/15	Prof. Ian Enochs, Visiting Speaker - Reefs and Ocean Acidification	
Th 11/17	Prof. Craig Young, Visiting Speaker - mangroves	

**Week 9**

Discussion Tropical Shells, collecting shells

Tues 11/22 Corals past and future

Review 5 Due, Final Distributed

**Week 10**

Discussion Group Project work, draft presentation, assign duties

Tues 11/29 Reef Fish and Tropical Conservation

Th Dec. 1 Some success stories...

**Week 10**

Discussion Polish Presentations, make sure report will be completed

Tues 12/6 Presentations

Th 12/8 Presentations

Group Projects Due in Class

**MONDAY, DEC 5**

**FINAL EXAM DUE, 12:30 - ONLINE OR IN PERSON**

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**READINGS TO BE ANNOUNCED FOR WEEKS 3-10**