BIOE 108/208: Marine Ecology

Summer 2014

Syllabus (updated 7/9/2014)

Dates: June 23 – July 25, 2014
Time: Mon, Wed, Fri: 9:00-11:30am
Location: Center for Ocean Health Classroom (COH 118), Long Marine Lab

Instructor: Kristin McCully
Email: kmccully@ucsc.edu
Office Hours: Monday and Wednesday 11:30 am – 12:30 pm
Location: COH Classroom or Trailer 731-102 (look for Kristin's name)

Teaching Assistant: Eva Salas
Email: esalasde@ucsc.edu
Office Hours: Friday 11:30 am – 12:30 pm and by appointment
Location: COH Classroom or COH 152B (look for Eva's name)
All emails must have in the subject line "BIOE 108".

Course Website: eCommons (contact Kristin if this course is not available on eCommons)

Course Objectives:
This course is intended to teach students both a basic understanding of the ecological processes that determine the structure and dynamics of populations and communities in coastal marine ecosystems, and how to conduct ecological research to reveal such processes. When students leave this course, they should know how to: (1) look for, identify and describe patterns in nature, (2) develop testable alternative hypotheses for the causes of observed patterns, and (3) design and carry out appropriate empirical tests of the predictions of hypotheses to explain observed patterns.

The structure of the course reflects these goals. Lectures are mixed with guest speakers conducting research in marine ecology and discussions of classic and recent papers in marine ecology. We will first discuss the process of doing science, review statistics and basic ecology, and then focus on unique elements of marine ecology. Many of the papers presented in lecture are central or seminal papers for paradigms in marine ecology. We will also spotlight current research in Marine Ecology to provide students with current examples of how one poses and tests hypotheses in ecology.

Discussions are based upon the idea that one way to learn to do good science is to evaluate the work of others. For this purpose, small groups of 2-3 students are responsible for leading discussions of papers subsequent to, and that complement, studies presented in lectures. See the separate handout on leading paper discussions.

Registration Deadlines

- Add deadline – Wed June 25
- Drop deadline (with full refund) – Sun June 29
- Withdraw period (no refund) – June 30 – July 11
- Note: Students must DROP themselves. Unlike during the regular school year, summer session courses are not dropped for nonpayment or no-show, so you will still be charged.

Optional Field Trips:

Saturday, June 28 8-10 am: intertidal field trip at Natural Bridges State Beach

Access through DeAnza trailer park at end of Delaware near LML gate

Wear clothes and shoes that you can walk in, get wet, and keep you warm!

Note: Low tide is -0.59 at 6:08 am, so you will see more if you come early.

Thursday, July 17 1-4:30 pm: voluntary field trip kayaking at Elkhorn Slough

Meet at 1 pm at Kayak Connections (between Moss Landing Valero gas station to N and harbor to S)

Dress and prepare for a cold and wet, but sunny day – layers are good!

Assessment:

Item:	**OLD**	**NEW**	**Notes:**
Pattern and Hypothesis Journals	25%	25%	Submitted weekly
Pre-Proposal		7%	Due Wed 7/16/14
Pre-Proposal Review		3%	Due Fri 7/18/14
Written Proposal	25%	15%	Due Sat 7/26/14 at midnight
Final Exam	20%	15%	Wed 7/23/14
Paper Discussion Question/Comments	5%	10%	Submitted for each discussion
Class Participation	5%	5%	Including quizzes
Leading Paper Discussion	10%	10%	Once in course
Oral Presentation of Proposal	10%	10%	Wed 7/23/14 or Fri 7/25/14

Interaction:

Interact with Kristin and Eva as much as you can. Learning how to do marine ecological research (or any form of research) is best done as an apprenticeship. Summer courses are meant to be treated as an "intensive course," so our goal is to spend as much time as possible in discussion with you about the scientific process, all the way from the abstract (i.e. the philosophy of science), through the more general (how you would go about devising specific tests for general hypotheses in your proposal; see below), to the specific (how to measure a particular variable and statistically analyze/interpret results). We encourage you to immerse yourself in the study of Marine Ecology… and what better time and place than summer in Santa Cruz?!

If due to a scheduling conflict you cannot attend office hours, or if you need more assistance than can be provided during regularly scheduled office hours, it is your responsibility to set up alternative meeting times with the TA or instructor. Under normal circumstances this should not be a problem

Academic Integrity Policy:

Plagiarism comes in lots of different flavors, ranging from the completely blatant (for example, handing in someone else's paper as your own), to the more subtle (not citing the sources you use in your paper properly -- even if you cite a book or paper as a general source, it is still plagiarism to lift whole phrases or sentences, unless you use direct quotes). Science is a process that builds successively on the work of the others, and giving proper credit for ideas and data is a critical part of this process. As such, I treat plagiarism very seriously. If you are caught cheating on an exam or in a major act of plagiarism, you will receive a failing grade (zero points) for that assignment, and I will file a report with the University (see the link below for UCSC's policy on academic integrity). If you commit a lesser act of plagiarism, you will receive a substantially lower grade on that assignment. The basic message I wish to convey is: Just don't do it. In this digital age, there is a surprisingly high probability that you will be caught. If you have questions about how to properly cite any sources you use in your work, please ask us.

http://www.ucsc.edu/academics/academic_integrity/undergraduate_students/.

Disability Resource Center (DRC) Accommodations:
If you qualify for classroom accommodations because of a disability, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me as soon as possible, preferably within the first week of the Summer Session during office hours. Contact DRC by phone at 831-459-2089 or by email at drc@ucsc.edu for more information.

Readings:

There will be no textbook, but instead we will read papers from the primary literature (listed below and available on the e-Commons website). We will try to keep required readings to a minimum in order to leave you more opportunity to read the appropriate literature to guide or help motivate your pre-proposal and proposal (see below). We will announce readings in class, but they are listed below (in the order we will discuss them).

- Keough, M.J. and B.J. Downes. 1982. Recruitment of marine invertebrates: the role of active larval choices and early mortality. Oecologia 54:348-352.
- Ebert, T.A. and M.P. Russell. 1998. Latitudinal variation in size structure of the west coast purple sea urchin: a correlation with headlands. Limnology and Oceanography 33:286-294.
- Connell, J.H. 1961. The influence of interspecific competition and other factors on the distribution of the barnacle *Chthamalus stellatus*. Ecology 42(4):710-723.
- Paine, R.T. 1966. Food web complexity and species diversity. American Naturalist 100:65-75.
- Sanford, E. 1999. Regulation of keystone predation by small changes in ocean temperature. Science 283 (5410):2095-2097.
- Lively, C.M. and P.T. Raimondi. 1987. Desiccation, predation, and mussel-barnacle interactions in the Northern Gulf of California. Oecologia 74:304-309.
- Gaines, S.D. and M.D. Bertness. 1992. Dispersal of juveniles and variable recruitment in sessile marine species. Nature 360:579-580.
- Jones, G.P. et al. 1999. Self-recruitment in a coral reef fish population. Nature 402:802-804.
- Hixon, M.A, and M.H. Carr. 1997. Synergistic predation, density dependence, and population regulation in marine fish. Science 277 (5328):946-949.
- Anthony, K.R.N. et al. 2008. Ocean acidification causes bleaching and productivity loss in coral reef builders. Proceedings of the National Academy of Science (PNAS) 105(45):17442-17446.
- Hughes, T.P. 1994. Catastrophes, phase shifts, and large-scale degradation of a Caribbean coral reef. Science 265(5178):1547-1551.
- Hughes, T.P. et al. 2007. Phase shifts, herbivory, and the resilience of coral reefs to climate change. Current Biology 17:360-365.

We will also recommend reading additional papers as background for the topics in lecture, but which are not empirical research papers that we will discuss. These papers may be included on the final exam and will include:

- Popper, K.R. 1934. Logic of scientific discovery. Chapter 1: A survey of some fundamental problems. New York: Basic Books, Inc.
- Quinn, J.F. and A.E. Dunham. 1983. On hypothesis testing in ecology and evolution. American Naturalist 122(5):602-617.
- Connell, J.H. 1978. Diversity in tropical rain forests and coral reefs. Science 199(4335):1302-1310.

Tentative Schedule (changes on 7/9/2014 in bold & red)

Day	Date	Topic	Assignments Due	Paper Discussion and/or Guest Speaker	Discussion Leaders
M	June 23	Introductions, logistics, pattern journals; Philosophy of Science	Begin pattern journal Background: Popper 1934	Speaker: Kristin McCully	
W	June 25	Statistics Review	Background: Quinn & Dunham 1983	Keough & Downes 1982	Eva Salas
F	June 27	Ecology Review	Pattern #1 due	Ebert & Russell 1988	Robert Weldy & Jaymes Sabater
M	June 30	Intertidal zonation-1	Feedback on Pattern #1 returned	Connell 1961 Speaker: Angela Quiros	Natalie Weil & Dylan Harris
W	July 2	Intertidal zonation-2	Patterns #1B & 2 due	Paine 1966, Sanford 1999 Speaker: Ann-Marie Osterback	Cristina Spina, Kendra Rowe, & Bridget O'Brien
F	July 4	HOLIDAY			
M	July 7	Maintenance of diversity-1	Feedback on Patterns #1B & 2 returned; Background: Connell 1978	Speaker: Kristin De Nesnera	
W	July 9	**Maintenance of diversity-2**		Lively & Raimondi 1987	Sarah Nevarez & Armand Yazdani
F	July 11	**"Barnacle Zone" SimBio activity**	Patterns #2B & 3 due **Time for discussing proposal**	**Hughes 1994**	**Michael Hernandez & Lauren Randall**
		Pre-settlement processes-1	**Video lecture & online quiz due midnight Sat July 12**		
M	July 14	Pre-settlement processes-2 (Eva Salas)	Feedback on Patterns #2B & 3 returned	Hixon & Carr 1997 Anthony et al. 2008	Molly Johnson & Karen Ichimaru
W	July 16	Pre-settlement processes-3	**Pre-proposal due**	**Gaines & Bertness 1992** **Jones et al. 1999**	**Jacqueline Adams, Zosha Wiktor, & Ariana Pacheco**
Th	**July 17**	**Kayaking at Elkhorn Slough (Kayak Connections)**			
		Mathematical models (video lecture)	**Video lecture & online quiz due midnight Thurs July 17**		
F	July 18	Mathematical models inquiry activity	**Review of pre-proposal due** Assigned reading: **TBA 7/16/14**	Speaker: Brent Hughes	
M	July 21	**Stability and life history responses**	**Patterns #3B & 4 due**	Hughes et al. 2007 Speaker: Helen Cooper	Anne Roth & Paul Bishop
W	July 23	FINAL EXAM			
F	July 25	PRESENTATIONS			
Sa	**July 26**		**Final proposal due 12 midnight**		