

**Ocean 621: Biological Oceanography Spring 2017**  
**(Monday, Wednesday, Friday 9:30-10:20 AM; MSB 315)**

**Instructors:**

Kyle Edwards, Office: Marine Science Building 612, kfe@hawaii.edu

Anna Neuheimer, Office Marine Science Building 614, annabn@hawaii.edu

**Guest Lecturers:**

Grieg Steward, University of Hawaii, Department of Oceanography

**Course Overview:**

Biological Oceanography (OCN 621) is one of several required core courses for graduate students in the Department of Oceanography at the University of Hawaii. The course meets three times each week (MWF) from 9:30-10:20 AM in the Marine Science Building classroom 315. Lectures and exams cover fundamental concepts in biological oceanography, including topics pertinent to the study of the ecology of pelagic and benthic organisms. Lectures include information related to the biomass and productivity of diverse marine ecosystems, assessment of bioelemental cycling of marine organisms, examination of environmental controls on the growth and mortality of marine organisms, and overview of how models can be applied to test hypotheses about ecosystem behaviors. The course focuses on plankton ecology, food web control of elemental cycling, and fisheries oceanography.

There is no required textbook for this course; however, instructors will assign reading material in the form of papers or book chapters. Students are expected to be familiar with material in these assigned readings.

**Student Learning Outcomes:**

- 1) Students should be able to define the major forms of life in the sea, describe the characteristics that distinguish these forms, and describe how these forms relate to each other ecologically.*
- 2) Students should be able to explain how marine organisms influence cycling of bioelements.*
- 3) Students should be able to describe prominent characteristics of the primary marine habitats.*
- 4) Students should be able to define processes that control the biomass, growth, and productivity of organisms in the marine environment.*
- 5) Students should be able to describe methodological approaches appropriate for evaluating the biomass, growth, and mortality of plankton, nekton, and sessile marine organisms.*

## **Grading:**

Grading for the course will be based on four criteria:

- 1) **Attendance (5%): Regular attendance and participation in weekly lectures.** Students are expected to attend all lectures and paper discussions, and should come familiar with the reading material assigned for each lecture or discussion.
- 2) **Reading Papers (15%): Reading papers assigned for each lecture.** Beyond the student-led discussions (see below), each lecture will have an assigned reading, and each reading will have a corresponding question. Students are expected to submit (via Lulima) their answer to the reading question with answers due before the start of the following lecture.
- 3) **Discussion Papers (20%): Participation and leadership during student-led paper discussions (10%), and written summaries and questions for the student-led paper discussions (10%).** Discussion leaders will be assigned early in the semester, and these leaders should provide (at least 2 days in advance of the discussion) students and instructors with a list of 5-6 questions intended to help promote discussion of the assigned paper(s). Prior to attending each paper discussion, all students submit a brief written summary of the paper, including 3-4 questions for contribution to the in-class paper discussions (~1 page total).
- 4) **Exam (60%): Performance on two written, in class exams (30% each).** Exams are not cumulative.

**Please note:**

- Any student who feels s/he may need an accommodation based on the impact of a disability is invited to contact the course instructors privately. We would be happy to work with you and the KOKUA Program (Office for Students with Disabilities) to ensure reasonable accommodations in the course. KOKUA can be reached at (808) 956-7511 or (808) 956-7612 (voice/text) in room 013 of the Queen Lili'uokalani Center for Student Services.
- UH's Counseling and Student Development Center is available for any personal, academic and career concerns. Their approach is "encouraging, collaborative, goal focused and culturally sensitive." They can be reached at 808-956-7927 and [manoa.hawaii.edu/counseling/](http://manoa.hawaii.edu/counseling/)
- The University of Hawai'i is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. Staff can also direct you to resources that are in the community. Here are some of your options:
  - As members of the University faculty, your instructors are required to immediately report any incident of potential sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and your instructors cannot guarantee confidentiality, you will still have options about how your case will be handled. Our goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.
  - If you wish to remain ANONYMOUS, speak with someone CONFIDENTIALLY, or would like to receive information and support in a CONFIDENTIAL setting, contact the confidential resources available here:  
<http://www.manoa.hawaii.edu/titleix/resources.html#confidential>
  - If you wish to directly REPORT an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support, contact: Dee Uwono Title IX Coordinator (808) 956-2299 [t9uhm@hawaii.edu](mailto:t9uhm@hawaii.edu)

## Course Schedule - Classes meet 9:30-10:20 AM

Date	Topic	Lecturer	Reading
Monday Jan. 9	Overview	Edwards	
Wednesday Jan. 11	Cell Biology	Edwards	Klausmeier et al. 2004
Friday Jan. 13	Biomass and Production	Edwards	Behrenfeld et al. 2016
Monday Jan. 16	<b>NO CLASSES - MLK Day</b>		
Wednesday Jan. 18	Blooms and Biomes	Edwards	Mahadevan et al. 2012
Friday Jan. 20	Phytoplankton Diversity	Edwards	Thompson et al. 2012
Monday Jan. 23	Phytoplankton Ecology	Edwards	Edwards et al. 2013
Wednesday Jan. 25	Bacteria and Archaea	Edwards	Teeling et al. 2012
Friday Jan. 27	Protists and Microbial Food Webs	Edwards	Biard et al. 2016
Monday Jan. 30	Viruses	Edwards	Zhao et al. 2013
Wednesday Feb. 1	Life at the Microscale	Edwards	Taylor & Stocker 2012
Friday Feb. 3	<a href="#">Student-led discussion paper – Microbial Ecology</a>	Edwards	Ward & Follows 2016
Monday Feb. 6	The Biological Carbon Pump	Edwards	Riley et al. 2012
Wednesday Feb. 8	Nutrient Cycles 1	Edwards	Martiny et al. 2013
Friday Feb. 10	Nutrient Cycles 2	Edwards	Weber & Deutsch 2012
Monday Feb. 13	Carbon Cycle and Climate	Edwards	TBD
Wednesday Feb. 15	<a href="#">Student-led discussion paper - Biogeochemistry</a>	Edwards	Assmy et al. 2013
Friday Feb. 17	Life in Sediments	Edwards	TBD
Monday Feb. 20	<b>NO CLASSES - Presidents Day</b>		
Wednesday Feb. 22	Benthic Microbial Ecology	Edwards	TBD

Friday Feb. 24	Benthic Ecosystem Processes	Edwards	TBD
Monday Feb. 27	NO CLASSES - ASLO		
Wednesday Mar. 1			
Friday Mar. 3			
Monday Mar. 6	Benthic Metazoans	Edwards	TBD
Wednesday Mar. 8	Benthic Macropatterns	Edwards	TBD
Friday Mar. 10	<a href="#">Student-led discussion paper – Benthic Ecology</a>	Edwards	Woolley et al. 2016
Monday Mar. 13	FINAL EXAM – PART 1	Edwards	
Wednesday Mar. 15	Size in the Ocean	Neuheimer	Andersen et al. 2016. Characteristic sizes of life in the ocean. Annu. Rev. Mar. Sci. 8:3.1-3.25
Friday Mar. 17	Zooplankton 1	Neuheimer	TBD
Monday Mar. 20	Zooplankton 2	Neuheimer	TBD
Wednesday Mar. 22	<a href="#">Student-led discussion paper - Zooplankton</a>	Neuheimer	<a href="#">Jónasdóttir et al. 2015. Seasonal copepod lipid pump promotes carbon sequestration in the deep North Atlantic. PNAS 112: 12122-12126.</a>
Friday Mar. 24	Zooplankton 3	Neuheimer	TBD
Monday Mar. 27	NO CLASSES – Spring Break		
Wednesday Mar. 29			
Friday Mar. 31			
Monday Apr. 3	Zooplankton 4	Neuheimer	TBD
Wednesday Apr. 5	Pelagic community ecology 1 - Food webs / Food Webs case study	Neuheimer	Hunt et al. 2011. Climate impacts on eastern Bering Sea foodwebs: a synthesis

			of new data and an assessment of the Oscillating Control Hypothesis. ICES J. Mar. Sci. 68:1230-1243.
Friday Apr. 7	Pelagic community ecology 2 - Food web variation in time	Neuheimer	TBD
Monday Apr. 11	Pelagic community ecology 3 - Food web variation in space	Neuheimer	TBD
Wednesday Apr. 10	Ocean resources 1	Neuheimer	TBD
Friday Apr. 12	Ocean resources 2	Neuheimer	TBD
Monday Apr. 14	<b>NO CLASSES – Good Friday</b>		
Wednesday Apr. 17	Fisheries oceanography 1	Neuheimer	TBD
Friday Apr. 19	Fisheries oceanography 2	Neuheimer	TBD
Monday Apr. 21	<a href="#">Student-led discussion paper – Fisheries</a>	Neuheimer	<a href="#">Woodson &amp; Litvin 2015. Ocean fronts drive marine fishery production and biogeochemical cycling. PNAS 112:1710-1715.</a>
Wednesday Apr. 24	Nearshore habitat structure & coral reefs	Neuheimer	TBD
Friday April 26	<a href="#">Student-led discussion paper – High latitude ecosystem structure</a>	Neuheimer	<a href="#">Hunt et al. 2011. Climate impacts on eastern Bering Sea foodwebs: a synthesis of new data and an assessment of the Oscillating Control Hypothesis. ICES J. Mar. Sci. 68:1230-1243.</a>
Monday April 28	Climate-driven changes in marine biota 1	Neuheimer	TBD
Wednesday May 1	Climate-driven changes in marine biota 2	Neuheimer	TBD
Monday May 3	Exam Review	Neuheimer	
	<b>FINAL EXAM – PART 2</b>	Neuheimer	