
Course number	EES 312W/412W (4 credits)
Course title	Research in Ocean Biogeochemistry
Term	Spring 2016
Meeting times and location	Class Lecture: MW 1:00-1:50PM, Hutchison Hall, Room 329

Course Description

This course will follow the scientific process conducting oceanographic research in the laboratory and at sea. This course will begin during the Spring Semester, will extend into the summer with a research expedition at sea lasting approximately 2 weeks, and will conclude during the Fall Semester. During the Spring Semester (EES 312W), this course will meet for 4 Credit Hours and students will work together and with the instructor to develop scientific hypotheses related to modern oceanographic biogeochemical processes. The students will also develop their own experimental plan to test their hypotheses, will formulate a formal written research proposal for their proposed research, and will begin their experiments. During the summer, students will enact their scientific plan at sea during an expedition lasting approximately 1-2 weeks. During this time period, students will collect samples and make measurements at sea with the instructor, other professional scientists, and graduate students. During the Fall Semester (EES 313), the students will reconvene for 2 Credit Hours to analyze their data and create formal presentations of their scientific work in both written and oral formats.

Prerequisites

EES 212 or 412

Due to the limited space on the research vessel for the at-sea component of this research experience, the instructor will be conducting interviews to individually select students for this course. Students must register for both EES 312W and EES 313.

Learning Goals and Outcomes

The primary goals of this course are (1) to equip students with the ability to formulate hypotheses, as well as plans to test those hypotheses, regarding current unknowns in ocean biogeochemistry and (2) to familiarize students with scientific experiments and sample collection to prepare them for their own independent research.

More specifically, at the end of this course, the student will be able to formulate a proposal for scientific research following the standard format of the National Science Foundation and adequately prepare for the field research.

Instructor Information

Name Professor John Kessler
Office location Hutchison Hall, Room 210
Email address john.kessler@rochester.edu
Telephone number (585) 273-4572
Office hours When I am not teaching or in the lab, my office door is almost always open. Please feel free to just stop by or you can make an appointment

Textbook and/or Resource Material

1) The Fine Art of Technical Writing (2011), by Carol Rosenblum Perry.
ISBN-10: 1461129249; ISBN-13: 978-1461129240

2) National Science Foundation: Grant Proposal Guide.
http://www.nsf.gov/pubs/policydocs/pappguide/nsf16001/gpg_index.jsp

3) Ocean Biogeochemical Dynamics (2006), by Jorge Sarmiento and Nicolas Gruber.
ISBN: 0691017077; ISBN-13: 9780691017075



4) The lecture slides, assignments, and additional course materials will be posted on *BlackBoard* as needed.

Course Structure

This course will start by introducing the goals and scientific experiments already planned for a research expedition. We will quickly transition into a student centered approach where the students will be given the freedom to develop their own ideas into valid scientific hypotheses. We will then develop the experimental plan necessary to test those ideas and hypotheses. Finally, we will prepare our hypotheses and experimental plans into formal written scientific proposals. Towards the conclusion of the semester, we will organize and practice our proposed experiments for the expedition in the summer.

Since one of the main goals of this course is to formulate a formal research proposal, weekly writing assignments will be interspersed within this course structure, helping student hone their writing skills.

Note: The course structure described here may deviate slightly from this general organization in order to accommodate examinations, holidays, and slight variations in the speed at which material is covered.

Grading Policies

Active and aggressive student participation is vital for the success of this research experience. In addition, a sound scientific plan is necessary for success at sea. Thus, the grading in this course will be based on these main factors: **class participation (20%), mock proposal: drafts, presentation, revisions, and reviews (20%), formal proposal: drafts, reviews, and revisions (20%), formal proposal: presentations of proposed research (20%)**. Class attendance will be recorded and any unscheduled absences will be promptly investigated by the instructor.

Course Topics, Calendar of Activities, Major Assignment Dates

Blue = Mock Proposal

Green = Real Proposal

In Class	
<p>Week 1 <i>Introduction</i> Wednesday, January 13: Organize class meeting time.</p>	<p><u>Read:</u> 1) Suess, (1999) 2) Kessler Proposal 3) Familiarize yourself with the NSF Grant Proposal Guide</p>
<p>Week 2 <i>Introduction and Proposal Development</i> Monday, January 18: No class. MLK Day. Wednesday, January 20: Introduction to course</p>	
<p>Week 3 <i>Proposal Development</i> Monday, January 25: Wednesday, January 27:</p>	<p><u>Read:</u> 1) Cicerone (1988) 2) Reeburgh (2003) 3) Reeburgh (2007)</p>
<p>Week 4 <i>Background and currently planned research</i> Monday, February 1: Present outlines Wednesday, February 3:</p>	<p>4) Valentine (2011) 5) Kessler (2014) 6) Skarke (2014)</p>
<p>Week 5 <i>Background and currently planned research</i> Monday, February 8: Introduction due Wednesday, February 10:</p>	
<p>Week 6 <i>Background and currently planned research</i> Monday, February 15: Backgrounds due and present questions Wednesday, February 17:</p>	<p><u>Due:</u> Three initial questions and accompanying hypotheses</p>
<p>Week 7 <i>Experimental details for already planned research</i> Monday, February 22: Experimental plans due and present hypotheses and ways to test hypotheses Wednesday, February 24:</p>	<p><u>Due:</u> One final question to investigate and accompanying hypothesis</p>
<p>Week 8 <i>Reviewing proposals</i> Monday, February 29: Complete proposal due Wednesday, March 2:</p>	<p><u>Due:</u> 1-2 page outline of research proposal</p>
<p>Week 9 Monday, March 7: No class. Spring Break. Wednesday, March 9: No class. Spring Break.</p>	

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Week 10 <i>Experimental details for already planned research</i> Monday, March 14: Proposal reviews due Wednesday, March 16:	
Week 11 <i>Planning new research</i> Monday, March 21: Revised proposal due Wednesday, March 23:	Due: Proposal Introduction, Background, and Hypotheses (5 – 10 pages)
Week 12 <i>Planning new research</i> Monday, March 28: Self-assessment due Wednesday, March 30:	Due: Proposal Experimental plan (5 pages)
Week 13 <i>Proposal Development</i> Monday, April 4: Proposal presentations Wednesday, April 6: Proposal presentations	Due: Revised Total Proposal Draft #1
Week 14 <i>Proposal Development & Prepare and practice experiments</i> Monday, April 11: Wednesday, April 13:	Due: Proposal Reviews
Week 15 <i>Prepare and practice experiments</i> Monday, April 18: Wednesday, April 20: Discuss general details for working at sea	Due: Final Total Proposal
Week 16 <i>Panel Review and Ranking of Proposals</i> Monday, April 25: Wednesday, April 27: Last Day of Class	Due: Panel Review Assignments
Week 17 <i>Present Proposed Research (20 min each)</i> Tuesday, May 3: 08:30 – 10:30am	Due: Proposed Research Presentations

Americans with Disabilities Act (ADA)

Center for Excellence in Teaching and Learning (CETL), 107 Lattimore Hall, 585-275-9049

<http://www.rochester.edu/college/cetl>

The Center for Excellence in Teaching and Learning (CETL) offers a variety of disability services for undergraduates and graduate students in Arts, Sciences & Engineering. These services aim to provide an inclusive experience and equal access to academic content and program requirements. Their approach relies on collaboration among students, CETL staff, and instructors. Students are invited to make an appointment to meet with a disability support coordinator to get acquainted and talk about classroom accommodations. CETL also provides transition support and self-advocacy skill development.

In addition, students can find information on other University accommodations and services, including transportation and campus accessibility at:

<http://www.rochester.edu/ada/>

Academic Honesty

All assignments and activities associated with this course must be performed in accordance with the University of Rochester's Academic Honesty Policy. Unless otherwise noted, I encourage collaboration when studying and investigating assignments. However, all individual assignments must be completed independently. In short, study together but write separately. A comprehensive description of the University of Rochester's Academic Honesty Policy is available at: www.rochester.edu/College/Honesty