
Course number	EES 312W (4 credits)
Course title	Research in Ocean Biogeochemistry
Term	Spring 2020
Meeting times and location	Class Lecture: MW 12:30-1:45PM, Hutchison Hall, Room 205

Prerequisites

EES 212 or 412

Beyond these prerequisites, this course will integrate material learned in Earth and Environmental Science majors to synthesize new insights with specific attention placed on ocean chemistry.

College Credit Hour Policy

This course follows the College credit hour policy for four-credit courses. This course meets two times weekly for three academic hours per week. The course also includes (1) extensive independent out-of-class writing assignments and (2) out-of-class laboratory training sessions for both analytical chemical and physical measurements and computer modeling. These laboratory training sessions will equip the students with the skills needed to be successful while working at sea.

Course Description

This course is designed to help students develop their own specific research interests in the field of ocean biogeochemistry. Students will work together and with the instructor to develop their own scientific interests and will mature those interests into testable scientific hypotheses. This objective will be achieved through a series of exercises involving in-class discussion, literature research, classroom lecture, writing, peer review, formal and informal presentations, and laboratory training sessions. Through this process the students will develop their own experimental plan to test their hypotheses, will formulate a formal written research proposal of their proposed research, will present and defend their proposal, and will conduct a formal panel review of their peers' research proposals. At the conclusion of this course, it is expected that the students will participate in both the oceanographic research expedition during the summer of 2020 (to execute their new scientific plan) and EES 313 during the fall semester of 2020 (to interpret their data and present their findings in formal written and oral formats).

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, (2) to familiarize students with scientific experiments and sample collection methodologies to prepare them for their own independent research, and (3) to develop the ability to write, review, and defend a formal proposal of research.

Overall, 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 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

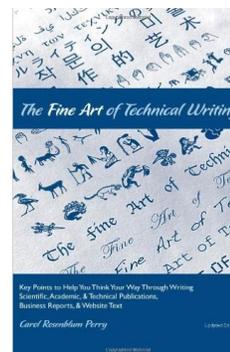
1) The Fine Art of Technical Writing (2011), by Carol Rosenblum Perry.
ISBN-10: 1461129249; ISBN-13: 978-1461129240

2) G. Gopen and J. Swan (1990), "The Science of Scientific Writing." American Scientist.

3) National Science Foundation: Grant Proposal Guide.
https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papp

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

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



Course Structure

This course takes a student centered approach where the students will be given the freedom to develop their own ideas into valid scientific hypotheses. The students will then develop the experimental plan necessary to test those ideas and hypotheses. Finally, the students will prepare their hypotheses and experimental plans into formal written scientific proposals. In order to accomplish these goals, the instructor and students will work together to identify strategies on how to discover exciting and necessary topics of research, while learning how to extract information from technical publications and write, review, revise, and defend a formal scientific proposal. More specific information is listed in the course calendar below.

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 course. Thus, the grading in this course will be based on these main factors: **homework (20%), class presentations (20%), class participation (20%), formal proposal (20%), formal proposal presentation (10%), and laboratory participation (10%)**. Class attendance will be recorded and any unscheduled absences will be promptly investigated by the instructor. Please note that since this course culminates with the students conducting scientific research at sea, regularly scheduled laboratory training sessions will be conducted outside of normal class time throughout the semester. Your participation in these training sessions is vital and will count for 10% of your grade.

Course Topics, Calendar of Activities, Major Assignment Dates

In Class	At Home
<p><i>Week 1 Introduction</i> Wednesday, January 15: Introduction to class</p>	
<p><i>Week 2 Introduction to Proposals and Reading Scientific Papers</i> Monday, January 20: Martin Luther King Day observed (No Class) Wednesday, January 22: Introduction to Proposals</p>	<p><u>Read:</u> 1) Kessler Proposal1 2) Kessler Proposal2</p>
<p><i>Week 3 Reading Scientific Papers and Literature Search</i> Monday, January 27: Reading Scientific Papers Wednesday, January 29: Reading Scientific Papers</p>	<p><u>Read:</u> 1) Suess1999 2) Brewer1999 3) Sabine2004 4) Cassar2009</p>
<p><i>Week 4 Literature Search</i> Monday, February 3: Searching literature for research topic with instructor Wednesday, February 5: Searching literature for research topic independent</p>	
<p><i>Week 5 Literature Search and Present General Research Ideas</i> Monday, February 10: Searching literature for research topic with instructor Wednesday, February 12: Searching literature for research topic independent</p>	<p>Prepare Presentation of general research interests</p>
<p><i>Week 6 Present General Research Ideas</i> Monday, February 17: Present 3 general research ideas Wednesday, February 19: Present 3 general research ideas</p>	<p>Prepare Presentation of general research interests</p>
<p><i>Week 7 Discuss technical writing</i> Monday, February 24: Discuss chapters in The Fine Art of Technical Writing Wednesday, February 26: Discuss chapters in The Fine Art of Technical Writing</p>	<p>Prepare Presentation of Technical Writing Chapters</p>
<p><i>Week 8 Discuss technical writing and Introduction to Proposal Writing</i> Monday, March 2: Discuss chapters in The Fine Art of Technical Writing Wednesday, March 4: Introduction to Proposal Writing</p>	<p><u>Read:</u> 1) Familiarize yourself with the NSF Grant Proposal Guide 1) Kessler Proposal1</p>
<p><i>Week 9</i> Monday, March 9: No class. Spring Break. Wednesday, March 11: No class. Spring Break.</p>	
<p><i>Week 10 Introduction to Proposal Writing & Writing and Reviewing Proposals</i> Monday, March 16: Introduction to Proposal Writing Wednesday, March 18: Review Introduction</p>	<p>Write and Self-Review Introduction</p>
<p><i>Week 11 Writing and Reviewing Proposals</i> Monday, March 23: Present Introduction Reviews (Self- and Peer-reviews) Wednesday, March 25: Review Background</p>	<p>Write and Self-Review Background</p>
<p><i>Week 12 Writing and Reviewing Proposals</i> Monday, March 30: Present Background Reviews (Self- and Peer-reviews) Wednesday, April 1: Review Research Plan</p>	<p>Write and Self-Review Research Plan</p>

Course Topics, Calendar of Activities, Major Assignment Dates

In Class	
<p><i>Week 13 Writing and Reviewing Proposals</i> Monday, April 6: Present Research Plan Reviews (Self- and Peer-reviews) Wednesday, April 8: Review One-Page Summary</p>	<p>Write and Self-Review One-Page Summary</p>
<p><i>Week 14 Writing and Reviewing Proposals</i> Monday, April 13: Present Summary Reviews (Self- and Peer-reviews) Wednesday, April 15: 2 Proposal Presentations followed by Panel Review</p>	<p>Prepare proposal presentation</p>
<p><i>Week 15 Proposal Presentations and Panel Review</i> Monday, April 20: 2 Proposal Presentations followed by Panel Review Wednesday, April 22: 2 Proposal Presentations followed by Panel Review</p>	<p>Prepare proposal presentation</p>
<p><i>Week 16 Proposal Presentations and Panel Review</i> Monday, April 27: 1 Proposal Presentation followed by Panel Review</p>	<p>Prepare proposal presentation</p>
<p><i>Week 17 Proposal Presentations and Panel Review</i> Monday, May 5: 08:30 – 10:30am</p>	

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. Since a major component of this course is writing, perhaps the biggest potential violation of academic honesty for this course will be plagiarism. Unless stated in writing by the instructor, all assignments must be in your own words and not copied or paraphrased from another source. If you have any questions about academic honesty, I encourage you to come talk to me prior to turning in assignments. A comprehensive description of the University of Rochester's Academic Honesty Policy is available at: www.rochester.edu/College/Honesty