SYLLABUS

Course number	EES 212/412 (4 credits)
Course title	A Climate Change Perspective to Chemical Oceanography
Term	Fall 2018
Meeting times and location	Class Lecture: TR 12:30-1:45PM, Hylan Hall, Room 201 Review Sessions: Review Sessions will be conducted before examinations. Please see the Course Schedule below for specific dates, times, and locations. Note: the review sessions will not be conducted in our normal classroom, so please see the Course Schedule for locations.

Course Description

Most introductory courses to chemical oceanography cover a variety of topics that are only related because they are under the broad umbrella of chemical oceanography. Some of these topics include carbon dioxide and inorganic carbon chemistry, salinity, marine nutrients, dissolved gases, and organic constituents. Similarly, most discussions of climate change and chemical oceanography only touch on ocean acidification. This course seeks to provide the same broad prospective to conventional chemical oceanography courses but will interweave the unifying theme of climate change into these numerous and diverse topics.

Prerequisites

CHM 131 and MTH 161

Learning Goals and Outcomes

The primary goals of this course are (1) to familiarize students with the current state of knowledge in the diverse topics of chemical oceanography and (2) to equip them with the ability to formulate, and create plans for testing, hypotheses regarding current unknowns in chemical oceanography and climate change science.

More specifically, at the end of this course, the student will be able to describe both with words and equations:
1) how chemical measurements in ocean waters are both modified by and help quantify geological, biological, and physical processes,
2) the transport of gases across the air-sea boundary,
3) the cycling and dynamics of organic matter and related chemical constituents (e.g. nutrients, trace metals, oxygen) in the water column from production to decomposition as well as in ocean sediments throughout the processes of deposition, remineralization, and burial,
4) the cycling of bulk carbon, inorganic carbon, nutrients, O_2, and silicates throughout the global ocean.

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

Teacher's Assistant Information

Name	Mr. Matt Loman
Office location	Hutchison Hall, Room 116
Email address	mloman@ur.rochester.edu
Office hours	Wednesdays 1:30-3pm, Hutchison Hall, room 130B

Textbook and/or Resource Material

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

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

Course Structure

This course is structured where the first half of each week will be spent with *Descriptive* lectures of specific oceanographic processes. The second half of each week will be conducted in a more *Quantitative* manner as the oceanographic processes introduced earlier are described mathematically. Occasionally, the instructor will use *Mathematica*© to explore these oceanographic processes with actual measurement data. Overall, we will seek to uncover what controls various chemical properties and distributions and how they may change with changing conditions. *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*.

Review Sessions

The Teacher's Assistant will conduct review sessions the day before each of the exams from **3-4PM in a room to be announced a few days prior**. Please see the course schedule for the specific weeks when review sessions will be offered. These review sessions are not a repeat of lecture material, but rather an opportunity to discuss specific problems that you may not fully comprehend. While your participation in these review sessions is not required, it is recommended.

Grading Policies

Grading will be based on the following: homework and class participation (20%), 3 exams (20% each), and a final exam (20%).

Course Topics, Calendar of Activities, Major Assignment Dates

In Class	At Home
Week 1 *Composition and Distribution of Chemicals in the Ocean* Thursday, August 30: Introduction & Descriptive Lecture	Read Preface & Ch. 1
Week 2 *Composition and Distribution of Chemicals in the Ocean* Tuesday, September 4: Descriptive Lecture Thursday, September 6: Quantitative Lecture	Read Preface & Ch. 1
Week 3 *Tracer Conservation and Ocean Transport* Tuesday, September 11: Descriptive Lecture **(HW #1 Due)** Thursday, September 13: Quantitative Lecture	Read Ch. 2
Week 4 *Air-Sea Interface* Tuesday, September 18: Descriptive Lecture **(HW #2 Due)** Thursday, September 20: Quantitative Lecture	Read Ch. 3
Week 5 *Organic Matter Production* Tuesday, September 25: Descriptive Lecture **(HW #3 Due)** Thursday, September 27: Quantitative Lecture	Read Ch. 4
Week 6 *Organic Matter Production* Monday, October 1, 3-4PM: Review Session, Hutchison Hall, room TBD Tuesday, October 2: **In Class Exam 1 on Ch. 1 – 3** Thursday, October 4: Quantitative Lecture	Read Ch. 4
Week 7 *Organic Matter Export and Remineralization* Tuesday, October 9: Descriptive Lecture **(HW #4 Due)** Thursday, October 11: Quantitative Lecture	Read Ch. 5
Week 8 *Remineralization and Burial in Sediments* Tuesday, October 16: ***No Class – Fall Break*** Thursday, October 18: Descriptive Lecture **(HW #5 Due)**	
Week 9 *Remineralization and Burial in Sediments / Silicate Cycle* Tuesday, October 23: Quantitative Lecture Thursday, October 25: Descriptive Lecture **(HW #6 Due)**	Read Ch. 6
Week 10 *Silicate Cycle* Tuesday, October 30: ***No Class*** Thursday, November 1: Quantitative Lecture	Read Ch. 7
Week 11 *Carbon Cycle* Monday, November 5, 3-4PM: Review Session, Hutchison Hall, room TBD Tuesday, November 6: **In Class Exam 2 on Ch. 4 – 6** Thursday, November 8: Descriptive Lecture	Read Ch. 8

Course Topics, Calendar of Activities, Major Assignment Dates

In Class	At Home
Week 12 *Carbon Cycle & Calcium Carbonate Cycle* Tuesday, November 13: Quantitative Lecture **(HW #7 Due)** Thursday, November 15: Descriptive Lecture	Read Ch. 8 & 9
Week 13 *Calcium Carbonate Cycle* Tuesday, November 20: Quantitative Lecture **(HW #8 Due)** Thursday, November 22: ***No Class – Thanksgiving***	Read Ch. 9
Week 14 *Carbon Cycle, CO_2, and Climate* Tuesday, November 27: Descriptive Lecture Thursday, November 29: Quantitative Lecture **(HW #9 Due)**	Read Ch. 10
Week 15 *Carbon Cycle, CO_2, and Climate* Tuesday, December 4: Quantitative Lecture **(HW #10 Due)** Wednesday, December 5, 2-3PM: Review Session, Hutchison Hall, room TBD Thursday, December 6: **In Class Exam 3 on Ch. 7 – 10**	Read Ch. 10 STUDY!
Week 16 Tuesday, December 11: Review for Final Exam Friday, December 14, 3-4PM: Review Session, Hutchison Hall, room TBD Tuesday, December 18: **Final Exam (Comprehensive) 7:15 – 9:15PM**	STUDY!

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/eoc/

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:
https://www.rochester.edu/college/honesty/