

Oceanography 400: Chemical Oceanography:

Winter 2009

Class web site: www.ocean.washington.edu/courses/oc400

Professor:

Jim Murray

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Office Hours: Every Day from 1030-1130 (or make an appointment)

TA:

Andrea Fassbender

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Office Hours: Wednesday 3-4PM (or by appointment)

Class Periods: MTWThF 9:30 - 10:20 OSB425

Course Description

Course Description: The course content is shown in the Syllabus and consists of 19 lectures (sometimes more than one class period per lecture). See Syllabus for important dates.

The main unifying science **Theme #1** is **The Global Carbon Cycle**. The syllabus is organized into three broad subthemes.

Theme #2. What controls the composition of seawater and are humans changing it?

Theme #3. What are the Chemical Constraints on Biological Production in the Ocean?

Theme #4. What is the Fate of organic matter produced by biological production and what are the impacts of this organic matter on the ocean and underlying sediments?

Learning Objectives: We will emphasize **concepts** rather than **facts**. The most important things you should get from this class are tools you can apply to problems and an appreciation of current hot topics that drive research in Chemical Oceanography. By the end of this class you will be able to:

- 1) conduct simple chemical equilibrium calculations – like at what CO₂ level will CaCO₃ reefs dissolve?
- 2) construct simple mass balance box models – for example what would atmospheric CO₂ be if there was no ocean biology?
- 3) critique literature in oral presentations – some papers will be older classics, others will be hot and new.

Teaching: The Professor is Jim Murray. His background is in inorganic chemical oceanography. His current interests are nitrogen cycling in the Black Sea and the origin of iron and impacts on biology in the equatorial Pacific. See his web site (below) for more information about his research interests:

<http://www.ocean.washington.edu/people/faculty/jmurray/jmurray.html>

Andrea Fassbender is the Teaching Assistant. She is a second year graduate student in chemical oceanography. Her research is concerned with ocean acidification in the northeast Pacific.

Reading: Emerson and Hedges (2008) Chemical Oceanography and the Marine Carbon Cycle. Cambridge University Press

Additional supplemental reading passed out

Web Site: This contains the PowerPoint slides that will be used for lectures. It also includes PDF versions of the papers used for class paper discussions.

Summary of Grading:

General Class participation	5%
Discussion paper questions (4 x 2.5%)	10%
5 Problem sets (5 x 5%)	25%
Midterm #1 (January 30)	30%
Midterm #2 (February 26)	30%

Class Participation: To succeed in this class you will need to participate. Participation consists of showing up on time, being prepared, asking questions and participating in discussion and will count **5%** of the grade. Get to know your professor and TA.

Problem Sets: There will be five problem sets.
* These are to be turned into the TA by 0930 on the day they are due (see schedule).
* Late submissions will not be graded unless cleared with the TA in advance.

This class has a strong quantitative orientation and doing well on the problem sets will be necessary for doing well on the exams. Grading will evaluate your understanding of the method as well as the correct numerical result. The problem sets will count **25%** of the final grade. Students are encouraged to work together on problem sets.

Paper Discussions: There will be four paper discussions in class.

The goal of these discussions is to study examples of how the Themes for the course are covered in the literature.

- * The papers chosen will be pertinent to the main themes of the class (see syllabus for titles and dates).
- * The pdf versions of the papers will be on the web site but black and white copies will be distributed in class a week in advance.
- * The paper discussions will be led by the instructors who will prepare a powerpoint of the figures and tables from the paper.
- * Some guiding questions will be provided in advance to help focus your study before class.
- * Students should make a list of vocabulary that they would like explained at the start of class.
- * Students will bring one written question to class based on one figure or table. These will be handed in to the TA at the start of class.
- * Students will be divided into small groups to discuss the figures for 5+ minutes, then the class will reassemble and students will be randomly asked in class to come to the board and explain the Figures.
- * The Instructors will ask the class questions to make sure students understand the basic material and then to do more complex analysis
- * The Key Points will be summarized on the board as they emerge.
- * Connections with previous lectures will be drawn.
- * At the end of the discussion we will allow time to summarize what we have learned and where does this discussion lead to next.

Paper Questions:

After the Class Discussion there will be a follow up assignment. You will write a 1 paragraph answer to a question (or a series of short questions) based on the paper and class discussion. This will be due one week after the paper discussion. These answers will count **10%** of the grade (4 x 2.5% each).

Exams

There will be two mid-terms. These will be in class on Wednesday January 30 and Wednesday February 25. Each will be 2 hours (8:30 – 10:20). These will each count **30%** of the grade. Mid-term #1 will cover Lectures 1 – 10. Mid-Term #2 will primarily cover Lectures 11-19 but could require knowledge of the first 10 lectures.

There will be no Final Exam.

Both mid-term exams will be closed-book, however you may bring one page (double-sided) of notes/equations. The types of problems and questions in the quizzes and problem sets will prepare you for the mid-term. The mid-term may include questions about the paper discussions that were held in class.

Strategies for Success

We realize than many students have not had chemistry for some time so we will try our best to bridge that gap. Make sure you ask questions if you hear unfamiliar terms. Come see Jim Murray or Andrea Fassbender with any questions. Our office doors are always open if we are at UW. Getting to know your instructors is a key to success.

PowerPoint versions of the Lecture notes will be available on the web site.

Office hrs & e-mail

Come see us anytime you have questions or problems. If that is not convenient send questions by e-mail to either of us or make an appointment to meet.