

Syllabus

OCE 6XX: *Ocean Biogeochemistry*

Instructor Prof. Dennis A. Hansell
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Office Hours By appointment in SLAB #224

Day/Time: M/W 3:30-4:45 p.m.

Course Description from the University of Miami course catalog

Introductory course to understand the ocean as a system. It will cover the interactions between biological, chemical, and geological processes in the environment, all within the context of physical controls. In the ocean, biogeochemistry includes the cycling of both major (e.g., C, N, P, Si, O) and minor elements (such as Fe). Tracing the spatial and temporal variability of these elements provides insights on the biological and geochemical processes at work, as well as the hydrographic and other controls on those processes. In this course, the physical ocean system is introduced in the context of its controls on the biological system, which in turn controls distributions of bioactive elements. Considered here are the major processes controlling ocean productivity, its roles as a carbon sink, organic matter production and consumption, the cycling of nutrients, the inorganic carbon system, and biogeochemistry of the sediments. **Book**
A text book is not required, but a laptop is necessary to complete assignments.

Recommended reference books:

Descriptive Physical Oceanography, An Introduction. Talley, Pickard, Emery, Swift, 2011.
Elsevier Press.

Ocean Biogeochemical Dynamics. Sarmiento & Gruber, 2006, Princeton University Press,
The figures and book errata are available at
<http://www.up.ethz.ch/people/ngruber/textbook>.

Introduction to Marine Biogeochemistry. Susan M. Libes, 2009, Academic Press.

Course Notes:

1. Powerpoint copies of the lectures will be available on “Blackboard” a few hours before each lecture. Once up, they will be kept there for the duration of the course.
2. Exams: There will be 4 exams, each worth 20% of grade (totaling 80%). These will be short essay exams that will test your understanding of the concepts and ocean processes presented. The exam material will be based on lecture material, homework problems, and ocean data manipulation and interpretation.

3. Homework problems (10% of grade): Problems will be assigned when we first begin covering a topic, with the problems sets due 1 week from the assignment date. Late submissions of homework assignments will not be given full credit.
4. A 10-15 minute Powerpoint presentation (10% of grade) will be required of each student in the last days of class. The topic will be chosen by the student in consultation with the professor.
5. Grading is done on a curve. The key to a high grade is a high cumulative point total. Attendance and participation (your questions and discussion) will be recognized should your course grade be in the gray area.
6. Religious holidays/conflicts with test dates: If you have conflicts, notice from the student should be given to the instructor no later than the end of the first three meeting days of the course.
7. Attendance policy: I expect students to attend every class meeting in order to learn the material and be prepared for evaluation of their knowledge. Having more than 2 unexcused absences precludes earning an "A" in the course. Excused absences that I will try to accommodate include: personal illness, death or critical illness in the family, participation in university-sponsored activities, field research, jury and military duties.

Guiding Quote: "Doubt is the essence of science" (Bertrand Russell); in other words, do not believe everything you are told.

Schedule	<p>Week 1</p> <p style="padding-left: 20px;">Introduction to course</p> <p style="padding-left: 20px;">Ocean Physical System; surface circulation</p> <p>Week 2</p> <p style="padding-left: 20px;">Ocean Physical System; surface circulation</p> <p style="padding-left: 20px;">Ocean Data View (ODV)</p> <p>Week 3</p> <p style="padding-left: 20px;">Ocean Data View (ODV)</p> <p style="padding-left: 20px;">Ocean Physical System; deep circulation</p> <p>Week 4</p> <p style="padding-left: 20px;">Ocean Physical System; deep circulation</p> <p style="padding-left: 20px;">First Examination</p> <p>Week 5</p> <p style="padding-left: 20px;">Review Exam; start Organic Matter Production</p> <p style="padding-left: 20px;">Organic Matter Production</p> <p>Week 6</p> <p style="padding-left: 20px;">Oxygen in Upper Ocean</p> <p style="padding-left: 20px;">Upper Ocean Nitrogen Cycle (New, Regenerated and Export Production)</p> <p>Week 7</p> <p style="padding-left: 20px;">Particulate Organic Matter (POM) Export</p> <p style="padding-left: 20px;">Dissolved Organic Matter (DOM)</p>
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- Week 8
 - Second Examination
 - Review Exam; start Deep Ocean Remineralization & Oxygen
- Week 9
 - Deep Ocean Remineralization & Oxygen
 - Colored Dissolved Organic Matter
- Week 10
 - Deep N Cycle (N₂ fixation & Denitrification)
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- Week 11
 - Trace Element Biogeochemistry
 - Hydrothermal Inputs of Trace Elements
- Week 12
 - Silicon Cycle
 - Sediment Biogeochemistry
- Week 13
 - Third exam
 - Review exam; Inorganic Carbon
- Week 14
 - Thanksgiving Break
 - Thanksgiving Break
- Week 15
 - Calcium Carbonate
 - Presentations
- Week 16
 - Presentations
 - Final Comprehensive Exam