

**GEOG 4930/7930 Oceanography: Chemical
Winter Term 2018**

Class meetings: Tuesdays and Thursdays, 8:30 – 9:45 am, Wallace 243

Office hours: Mondays 3 – 5 pm, find me in Wallace 521

Instructor: Kathleen Munson, Wallace 521 (researchers office)
kathleen.munson@umanitoba.ca
204-979-1453 (mobile phone)

Course objectives: This course will introduce students to the cycling of major and trace chemical components of seawater. Students will be taught quantitative skills that are routinely used in current oceanographic research. Students will develop skills that can contribute to their own research projects or prepare them for advanced study of the biogeochemical cycling of macro- and micronutrients.

Texts: We will use primary literature and handouts as our texts. A full list of resources will be maintained and available in class or by contacting me. There are many texts available that can provide additional background on class material. This is the list of the ones I own and am therefore most likely to use:

Libes, *Introduction to the Marine Biogeochemistry*, 2nd edition
Sarmiento and Gruber, *Ocean Biogeochemical Dynamics*
Pilson, *An Introduction to the Chemistry of the Sea*, 1st edition (a 2nd edition is available)
Emerson and Hedges, *Chemical Oceanography and the Marine Carbon Cycle*
Bernier, *Global Environment: Water, Air, and Geochemical Cycles*
Broecker and Peng, *Tracers in the Sea*

Grade components:

Class check-ins: 5%
Assignments: 35%
Mid-term exam: 20%
Final exam: 20%
Class project: 20%

Class check-ins: I will call on you to contribute orally or to submit brief written responses during class. These are opportunities to test your understanding of class content. You will not be graded on the accuracy of your answers, but rather on your willingness to make reasonable assumptions and contribute to class discussion.

Assignments: There will be 8 problem sets that emphasize quantitative evaluation of course material. The problem sets will be available on Thursdays and due in class on Tuesdays a week and a half later. You will have 2 office hour periods to approach me with questions. You are encouraged to work with other students if you find this helpful. However, remember that your colleagues cannot answer exam questions for you. You are responsible for your understanding of the material.

Exams: There will be two exams, each worth 20% of your grade. The first exam will be 15 Feb and will cover material through 8 Feb (1 week prior to exam) the second exam will be scheduled by the department and will cover all material presented during the semester, with an emphasis on material presented since 13 Feb as well as the incorporation of material from the entire semester.

Class projects: Each student will prepare a class project on a topic in chemical oceanography. Topics and papers will be selected in consultation with me and topic selection will be due 27 Feb. Undergraduate students will prepare and present a 10-minute talk on a paper from recent literature.

Graduate students will prepare and present a 10-minute talk on a current research topic and submit a 10-page written report.

Accessibility: The University of Manitoba is committed to providing all members of the University community, including those with disabilities, with an accessible learning environment. Student Accessibility Services offers assistance to those who require services. If you have, or think you may have, a disability, you may contact the Student Accessibility Services for assessment.

Their website is: <http://umanitoba.ca/student/saa/accessibility/>

I welcome all students with disabilities to participate in this class. If you have a documented disability, please talk to me so that we can plan support for you to achieve your goals in this class. If you have an undocumented disability or if you choose not to register your disability, I invite you to talk to me so that we can create a plan to maximize your learning.

Course schedule:

Date	Lecture Topic	Notes	Assignment
4 Jan	Introduction: seawater, ocean circulation		Download ODV (in class)
9 Jan	Geochemical mass balance, box models		Select chemical of interest
11 Jan	Major ions and salinity		
16 Jan	Arctic and sub-Arctic oceanography		Problem set 1 due
18 Jan	Stable isotopes		
23 Jan	Radioactive isotopes		Problem set 2 due
25 Jan	Air-sea exchange		
30 Jan	Carbonate system (1)		Problem set 3 due
1 Feb	Carbonate system (2)	Guest speaker	
6 Feb	Primary production (1)		Problem set 4 due
8 Feb	Primary production (2)		
13 Feb	New and export production		
15 Feb	Midterm		
20 Feb	<i>No class</i>		
22 Feb	<i>No class</i>		
27 Feb	Remineralization		Project topics due
1 Mar	Organic sediments		
6 Mar	Inorganic sediments		Problem set 5 due
8 Mar	Carbon cycle (1)		
13 Mar	Carbon cycle (2)	Course project check-in	Problem set 6 due
15 Mar	Nitrogen cycle		
20 Mar	Phosphorus cycle		Problem set 7 due
22 Mar	Oxygen and sulfur cycles		
27 Mar	Trace element cycles		Problem set 8 due
29 Mar	Contaminants		
3 Apr	Course project presentations		
5 Apr	Return to Arctic and sub-Arctic oceanography/review		
TBD	Final exam		