

**GEOG 4930/7930 Oceanography: Chemical
Winter Term 2020**

Class meetings: Wednesdays, 8:30 – 11:20 am, St. Paul's College, room 123

Office hours: Mondays 3 – 5 pm, Wallace 499

Instructor: Kathleen Munson, Wallace 499

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Course objectives: This course will introduce students to major and trace chemical cycling in seawater. Students will develop quantitative skills that are routinely used in oceanographic research. Students will apply their learning to a class manuscript on a major topic in chemical oceanography to prepare them for independent 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 on UM Learn. Additional background information can be found in the following textbooks:

Sarmiento and Gruber, *Ocean Biogeochemical Dynamics*

Pilson, *An Introduction to the Chemistry of the Sea*, 1st ed. (2nd ed. available)

Emerson and Hedges, *Chemical Oceanography and the Marine Carbon Cycle*

Libes, *Introduction to the Marine Biogeochemistry*, 2nd edition

Berner, *Global Environment: Water, Air, and Geochemical Cycles*

Broecker and Peng, *Tracers in the Sea*

Grade components:

In the news: 5%

Assignments: 35%

Mid-term exam: 20%

Final exam: 20%

Class manuscript: 20%

In the news: At the end of each class we will review recent findings from journals and/or media reports. Each student will present content and lead class discussion 2-3 times per term. You are not expected to demonstrate mastery of the topics but will be assessed on your willingness to make reasonable assumptions and contribute to class discussion.

Assignments: Four problem sets will emphasize quantitative evaluation of course material. Problem sets will be available 2 weeks before they are due. You are encouraged to work with classmates, although you are responsible for your understanding of the material.

Exams: Two exams will each be worth 20% of your grade. The first exam will be 12 Feb and will cover material through 5 Feb. The second exam will be scheduled by the department and will emphasize material presented since 12 Feb, although some material from the entire semester will be incorporated.

Class manuscript: Each student will contribute to the preparation of a manuscript from existing data. Students will be graded on both individual and group components. Each student will be responsible for preparing a figure and/or table, including data evaluation and error analysis. Each student will also coordinate the preparation of a section of the manuscript and contribute to others sections.

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: <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.

Date	Lecture Topic	Tutorial	News	Assignment
8 Jan	Introduction: ocean circulation, water mass tracers	Dissecting a manuscript, forming hypotheses	KMM	Download dataset, ODV
15 Jan	Stable and radioactive isotopes	Ocean Data View, QA/QC, error analysis	Student	
22 Jan	Geochemical mass balance, box models	Figure preparation	Student	Problem set 1 due
29 Jan	Ocean-sea ice-atmosphere	Results review	Student	Preliminary figures/table
5 Feb	Primary production	Discussion outline	Student	Problem set 2 due
12 Feb	Remineralization	Mid-term exam	KMM	
19 Feb	<i>Term break, no class</i>			
26 Feb	Organic carbon system	Abstract drafting	Student	Problem set 3 due
4 Mar	Inorganic carbon system	Results editing	Student	
11 Mar	Nutrient cycling	Discussion revision	Student	
18 Mar	Sediments	Materials and methods	Student	Problem set 4 due
25 Mar	Contaminants	Introduction	Student	
1 Apr	Paleoceanography, paleoclimatology, and climate change	Journal submission	KMM	
TBD	Final exam			