

Marine Chemistry (SIOG 260), Winter Quarter 2022

Instructors: **Andrew Dickson** (adickson@ucsd.edu), **Kathy Barbeau** (kbarbeau@ucsd.edu)

TA: **Max Fenton**, mfenton@ucsd.edu

Meeting Time and Place: **MWF, 11-11:50 am**. Eckart 227 (when not remote)

Weekly TA-led discussion sessions: Fridays, 10-10:50 am

Requirements: Grades will be based on homework (25%), paper (25%), and two take-home exams (25% each).

Grading Scale:

A: 90-100% B: 80-89% C: 70-79% D: 60-69% F: less than 59%

Primary text: Emerson and Hedges: *Chemical Oceanography and the Marine Carbon Cycle* (Cambridge University Press). Available in electronic format from the UCSD library and in various formats on Amazon.com.

Additional useful texts: Millero, *Chemical Oceanography, 4thEd.*
Pilson, *An Introduction to the Chemistry of the Sea* *
Pankow, *Aquatic Chemistry Concepts*
Broecker and Peng, *Tracers in the Sea*
Chester, *Marine Geochemistry* *
Sarmiento and Gruber, *Ocean biogeochemical dynamics* *

* These texts are also available electronically through libraries.ucsd.edu

Course website on Canvas: recordings of each lecture and lecture slides will be posted on the course website after the lecture. Homework sets, homework answers, and additional materials will be posted as necessary.

Inclusion statement: We acknowledge that students enter this class from a variety of different backgrounds with a diversity of learning styles. Our aim is to teach to the full range of students in this course, rather than the mythical “average” student (<https://www.youtube.com/watch?v=4eBmyttcfU4>). As we, your instructors, strive to create an environment that supports diversity and the safe and free exchange of ideas, these goals are most effectively achieved through collaboration between instructors and students. As such, we depend on, and heartily welcome, your questions and constructive feedback throughout the course.

All students are expected to:

- Attend all classes. Contact instructors if an extended absence is expected (e.g. fieldwork)
- Participate actively in discussions and classroom exercises
- Seek assistance from your instructors and/or TA if needed.
- Complete assigned readings and all course assignments & projects

Disability Accommodation Statement:

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty and to the OSD Liaison in the department in advance so that accommodations may be arranged. Contact the OSD for further information: 858.534.4382 (phone) | osd@ucsd.edu(email) | <http://disabilities.ucsd.edu>(website)

Basic Needs: Any student who faces challenges securing their food or housing is urged to contact the Dean of the Graduate Division for support or the newly launched Basic Needs website <http://basicneeds.ucsd.edu/>.

Title IX Statement

The Office for the Prevention of Harassment and Discrimination (OPHD) is the Title IX Office for UC San Diego and investigates reports of sexual harassment, sexual violence, dating and domestic violence and stalking. You may file a report online with the UC San Diego Office for the Prevention of Harassment and Discrimination (OPHD) at <http://ophd.ucsd.edu/reportbiasform.asp> or you may call OPHD at 858-534-8298. For further information about OPHD, please visit <http://ophd.ucsd.edu/>. If you are not ready to file a report, but wish to receive confidential support and advocacy, please contact [CARE at the Sexual Assault Resource Center](#) (CARE at SARC). CARE at SARC provides violence prevention education for the entire UCSD campus and offers free and confidential services for students, staff and faculty impacted by sexual assault, relationship violence and stalking.

Academic integrity

Academic Integrity is expected of everyone at UC San Diego. This means that you must be honest, fair, responsible, respectful, and trustworthy in all of your actions. Lying, cheating or any other forms of dishonesty will not be tolerated because they undermine learning and the University's ability to certify students' knowledge and abilities. Thus, any attempt to get, or help another get, a grade by cheating, lying or dishonesty will be reported to the Academic Integrity Office and will result in sanctions. Sanctions can include an F in this class and suspension or dismissal from the University. So, think carefully before you act by asking yourself: a) is what I'm about to do or submit for credit an honest, fair, respectful, responsible & trustworthy representation of my knowledge and abilities at this time and, b) would my instructor approve of my action? You are ultimately the only person responsible for your behavior. So, if you are unsure, don't ask a friend—ask your instructor, instructional assistant, or the Academic Integrity Office. You can learn more about academic integrity at academicintegrity.ucsd.edu (Source: Academic Integrity Office, 2018) Specific instructions about what degree of collaboration between students is permissible on homework, projects, or exams will be provided by the instructors.

Changes to the Course Syllabus: The following lecture schedule is a general plan for the course; deviations announced to the class by the instructor may be necessary.

Jan 3 M	Course overview, chemical concepts - Dickson & Barbeau	Assignments
Tools, Physicochemical Processes, Inputs/Outputs, SW Composition		
Jan 5 W	Stable Isotope Tools - Barbeau	
Jan 7 F	Radioisotope Tools - Barbeau	
Jan 10 M	Thermodynamics/chemical equilibria I - Dickson	
Jan 12 W	Thermodynamics/chemical equilibria II - Dickson	
Jan 14 F	Acid-Base equilibria - Dickson	Paper posted
Jan 17 M	<i>MLK Holiday</i>	HW1 posted
Jan 19 W	Kinetics - Dickson	
Jan 21 F	Air-sea exchange/water cycle - Dickson	
Jan 24 M	Ocean circulation/water column structure - Dickson	HW1 due
Jan 26 W	Inputs – rivers, groundwater, vents - Dickson	
Jan 28 F	Outputs and sinks - Dickson	HW2 posted
Jan 31 M	Residence time, circulation, elemental distribution - Dickson	Paper outline due
Feb 2 W	Salinity and major elements - Dickson	
Feb 4 F	CO ₂ system equilibria in seawater- Dickson	HW2 due
	MIDTERM	Midterm posted
Water column biogeochemistry, sediments, human influence		
Feb 7 M	Production - Barbeau	
Feb 9 W	Respiration - Barbeau	Midterm due
Feb 11 F	Nutrients, Redfield- Barbeau	HW3 posted
Feb 14 M	Macronutrient cycles- Barbeau	
Feb 16 W	Micronutrients - Barbeau	
Feb 18 F	Ocean carbon cycle - Dickson	HW3 due
Feb 21 M	<i>President's Day Holiday</i>	Paper due (2/22)
Feb 23 W	Trace element geochemistry - Barbeau	
Feb 25 F	Organic geochemistry - Barbeau	HW4 posted
Feb 28 M	Sediment diagenesis - Barbeau	
Mar 2 W	Sediment record - Barbeau	
Mar 4 F	Coasts and estuaries - Barbeau	HW4 due
Mar 7 M	Anthropogenic CO ₂ and the oceans - Dickson	
Mar 9 W	Anthropogenic effects on biogeochemical cycles - Barbeau	
Mar 11 F	Review – Dickson & Barbeau	Final posted
	FINAL	Final due (3/16)