

## Marine Chemistry (SIOG 260), Winter Quarter 2020

Instructors: **Kathy Barbeau** (Sverdrup Hall 3119, x24339, kbarbeau@ucsd.edu),  
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TA: **Wiley Wolfe**, wwolfe@ucsd.edu

Meeting Time and Place: **MWF, 11-11:50**. Vaughan Hall, 100

Weekly TA-led problem sessions: TBD

**Requirements:** Grades will be based on homework and projects (50%), 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*

**Course website on Canvas:** pdf versions of each lecture 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 the instructors if an extended absence is expected (such as 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](mailto: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 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](http://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 6 (mon) – Course overview and general chemical concepts (Diaz & Barbeau)	
<b>Seawater Composition and Chemistry - Barbeau</b>	
Jan 8 (wed)	Residence time/circulation
Jan 10 (fri)	Ocean biology
Jan 13 (mon)	Geochemical cycles – weathering, rivers
Jan 15 (wed)	Geochemical cycles – hydrothermal vents
Jan 17 (fri)	Salinity/physical properties
Jan 20 (mon)	<i>MLK Holiday</i>
Jan 22 (wed)	Thermodynamics Background I - Equilibrium
Jan 24 (fri)	Thermodynamics Background II - Redox
Jan 27 (mon)	Kinetics
Jan 29 (wed)	Gases and air-sea exchange
Jan 31 (fri)	Acid-Base equilibria and the carbonate system
Feb 3 (mon)	Ocean CO <sub>2</sub> system and ocean acidification
Feb 5 (wed)	Calcite and opal
Feb 7 (fri)	Trace element geochemistry
Feb 10 (mon) – Review and transition (Diaz and Barbeau)	
<b>Biogeochemical Cycles - Diaz</b>	
Feb 12 (wed)	Tracers I
Feb 14 (fri)	Tracers II
Feb 17 (mon)	<i>Presidents' Day Holiday</i>
Feb 19 (wed)	Tracers III
Feb 21 (fri)	Production
Feb 24 (mon)	Respiration
Feb 26 (wed)	Nutrients, Redfield
Feb 28 (fri)	Macronutrient cycles
Mar 2 (mon)	Micronutrients
Mar 4 (wed)	Carbon cycle
Mar 6 (fri)	Organic geochemistry
Mar 9 (mon)	Sediment diagenesis
Mar 11 (wed)	Sedimentary record
Mar 13 (fri)	Anthropogenic impacts on biogeochemical cycles