Chemical Oceanography MARS 8020, Spring 2017
Tue/Thu 2 – 3:15 pm
Room 261, Marine Sciences Bldg

Instructors: Christof Meile (cmeile@uga.edu); Patricia Medeiros (medeiros@uga.edu)

Content: This course will cover most of the fields of chemical oceanography/marine chemistry. Students are expected to have had knowledge in general chemistry and oceanography, and high motivation in learning. There will be some extra reading materials, reasonable amount of home works, and two tests and a final exam.

Grades: Two tests and a Final Exam, 25% each; home work 20%, and paper discussion & classroom participation 5%.
Recommended Textbook: Emerson S. & Hedges J. 2008. Chemical Oceanography and the Marine Carbon Cycle. Cambridge University Press. ISBN: ISBN: 9780521833134

Academic Honesty: As a University of Georgia student, you have agreed to abide by the University's academic honesty policy, "A Culture of Honesty," and the Student Honor Code. All academic work must meet the standards described in "A Culture of Honesty" found at: https://ovpi.uga.edu/academic-honesty/academic-honesty-policy. Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

Plagiarism ("to take ideas, writings, etc. from another and pass them off as one's own", Webster's New World Dictionary) will not be tolerated. There are several forms of plagiarism, ranging from outsourcing your work to somebody else, to slight rewording of a published text or summarizing a text without citing it. If you are in doubt consult with the instructor *before* you hand something in.

Changes to the Course Syllabus: The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary. Failure to regularly attend class may result in your being uninformed about changes in the course content or timing of assignments. Students who miss class are responsible for all announcements and assignments given in lecture.

Access Statement: The University of Georgia is committed to providing access for all people with disabilities and will provide accommodations if notified prior to the start of the semester. Please contact the Disability Resource Center if you will need a sign language interpreter, assisted listening device, or other classroom accommodations. If you would like to discuss classroom and/or testing accommodations, please discuss your needs with the instructors of record as soon as possible.

Date	Topic	Instructor
	Water & Ionic Interactions	
5-Jan	About the course	CM
	1. structure of water	
	2. ions in water, ionic strength	
10-Jan	3. ion-ion interaction	CM
	4. inorganic speciation in seawater	
	Chemical Speciation	
12-Jan	1. complexation chemistry & chemical constants, solubility	CM
	2. processes controlling trace metal distribution (I); trace metal (II) organics/siderophores	
17-Jan	3. surface speciation, sorption etc.	CM
	Redox Reactions	
19-Jan	1. pe, Eh, and the Nernst equation	CM
	2. understanding pe-pH diagrams	
24-Jan	3. Balancing equations	CM
	4. role of O2 in marine redox, real world demonstrations of redox in the ocean	
	Dissolved Gases	
	5. gas solubility and rates of gas exchange across the air-sea	
26-Jan	interface	CM
31-Jan	review session/buffer	CM
2-Feb	**First Exam**	CM
	Major Elements in the Oceans	
7-Feb	1. major composition of seawater	CM
	2. weathering reaction and river fluxes	
	The Ocean CO_2 System	
	1. distributions and control mechanism of pH, pCO2, Alkalinity	
9-Feb	and total CO2	CM
	2. ocean acidification	
14-Feb	oceanic box models	CM
	Productivity and Nutrient Biogeochemistry	
16-Feb	1. photosynthesis, respiration, photic zone, sinking particles, etc.	CM
21-Feb	2. O_2 and CO_2 distribution in the oceans	CM
	3. O_2 as a measure of biological production and respiration	
	4. the Redfield Ratio	
23-Feb	5. distributions of N, P, and Si in the world ocean	CM

28-Feb	6. Iron and other trace metal cycles	CM
	The Seafloor & longer timescales	
2-Mar	1. glacial/interglacial differences in elemental cycles	CM
6-10-Mar	Spring break - No classes	
14-Mar	2. sediments: early diagenesis	CM
16-Mar	3. hydrothermal systems: vent chemistry	CM
21-Mar	**Second Exam**	CM
	Marine Organic Matter	
23-Mar	1. Organic matter chemistry and cutoffs	PM
	2. Organic matter cycle	
28-Mar	3. Terrestrial vs microbial biomarkers	PM
	4. Organic matter fluxes and transport	
30-Mar	5. Organic matter degradation	PM
	6. Molecular record: OM preservation	
	Isotopes as Tracers	
4-Apr	1. Stable isotopes: fractionation principles	PM
	2. Oxygen, carbon and nitrogen applications	
6-Apr	3. Radioisotopes principles	PM
	4. Radiocarbon applications - OM age	
11-Apr	5. Multi-tracers in marine organic chemistry studies	PM
	Processes at the Boundaries	
13-Apr	1. Anthropogenic chemicals entering the marine environment I	PM
18-Apr	2. Anthropogenic chemicals entering the marine environment II	PM
20-Apr	3. Using anthropogenic organic compounds as markers	PM
25-Apr	Review Session - Organic	PM
28-April – 4-May	**Third Exam (TBD)**	PM

Important dates:

5-11 -Jan	Drop/Add
16-Jan	MLK Day
20-Mar	Withdrawal Deadline

Textbook

Emerson S. & Hedges J. 2008. Chemical Oceanography and the Marine Carbon Cycle. Cambridge University Press. ISBN: ISBN: 9780521833134

Other relevant books:

Pilson, M.E.Q. 2013. An introduction to the chemistry of the sea. 2nd edition. Cambridge University Press. ISBN: 9780521887076
Sarmiento J.L & Gruber, N. 2006. Ocean Biogeochemical Dynamics. Princeton University Press. ISBN: 9780691017075
Stumm W. & Morgan J.J. 1995. Aquatic Chemistry. 3d edition Wiley. ISBN: 978-0-471-51185-4
Morel F.M.M. & Hering J.G. 1993. Principles and Applications of Aquatic Chemistry. Wiley. ISBN: 978-0-471-54896-6
Broecker W. and Peng T.-H. 1982. Tracers in the Sea.
http://eps.mcgill.ca/~egalbrai/Earth_System_Dynamics/Tracers_in_the_Sea.html;
http://www.ldeo.columbia.edu/~broecker/Home_files/TracersInTheSea_searchable.pdf