

**SYLLABUS Spring 2021**  
Tues. - Thurs. 2:00-3:20 pm

**Biogeochemistry – SIO 267**

Instructor: Ralph Keeling  
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Office Hours: Wed. 3:00-4:30

Prerequisites: *SIO 260 (Marine Chemistry), Inorganic Chemistry, Calculus*  
Texts: *Ocean Dynamics and the Carbon Cycle*, Williams and Follows (2011) Cambridge\*  
*Biogeochemistry: An analysis of global change*, Schlesinger and Bernhardt (2013)\*  
*Earth System Science*, Jacobson et al. (2000) Academic Press\*\*  
*Ocean Biogeochemical Dynamics*, Sarmiento and Gruber, Princeton (2006)\*  
*Terrestrial biosphere-atmosphere fluxes*, Monson and Baldocchi, Cambridge (2014)\*\*  
\*Available through Roger as EBook. \*\*Requested as Ebook.

Homework: Sets will be given out roughly weekly.

Units: 4. Grade: Letter grade only; 25% problem sets, 25% Midterm, 50% Term Paper

Date		Lecture	Background reading
Tue Mar 30	J	1. Course overview	
Thu Apr 1	J	2. Isotope basics	Earth System Science Chap. 4.1-4.2
Tue Apr 6	J	3. Hydrological cycle & isotope	Earth System Science Chap. 7 Earth System Science Page 471
Thu Apr 8	J	4. Box models & transport	Williams and Follows, 3.1-3.2
Tue Apr 13	J	5. Radiocarbon: tracer and clock	Broecker: Treatise on Geochem.
Thu Apr 15	R	6. Aqueous chemistry of CO <sub>2</sub>	Williams & Follows, 6.1-6.3
Tue Apr 20	R	7. Aqueous chemistry of CO <sub>2</sub>	
Thu Apr 22	R	8. Air-sea gas exchange	Williams & Follows, 6.6
Tue Apr 27	R	9. Anthropogenic carbon	Williams & Follows, 6.5
Thu Apr 29	R	10. Carbonate chemistry and ocean acidification	Earth System Science Chap. 10
Tue May 4		MIDTERM	
Thu May 6	R	11. Land Carbon Sink	(Biogeochemistry Chap. 5)
Tue May 11	R	12. CO <sub>2</sub> fertilization	Monson and Baldocchi, 4.2, Chap 5
Thu May 13	R	13. Carbon-water relationships	
Tue May 18	J	14-15. CO <sub>2</sub> on glacial and 10 <sup>6</sup> -yr time scales	
Thu May 20	J	16-17. Methane, N <sub>2</sub> O and Ice-core records	
Tue May 25	J	18. Atmospheric O <sub>2</sub>	
Thu May 27	J	19. Snowball Earth	
Tue Jun 1		Presentations 1	
Thu Jun 3		Presentations 2	
Tue Jun 8		“Make-up Midterm”	2:00 - 5:00 p.m ??