Spring 2019 Syllabus **Revised 01/13/2019**

MSL 660: Chemical Oceanography 3 credits
Class meeting times: T,Th 09:45-11:15 Prerequisites: Graduate standing
Location: 138 Irving II

Instructor:

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Office Hours: M,W 1:30-3:00 or by appointment

Course Description: An integrated study of the chemical, biological and physical processes that determine the distribution of chemical variables in the sea. Topics include biogeochemical cycles and the use of tracers to follow these complex chemical cycles. The chemistry of carbon is considered in detail. Interactions with the atmosphere and lithosphere (including implications of the mid-ocean ridge vent system to ocean chemistry) are examined. Chemical oceanography is one of the four major fields of oceanography. We will examine the ocean as a chemical system by covering fluxes across boundaries with the land, atmosphere, sediments and hydrothermal vents, and by focusing on the internal cycling of elements driven by biological and

Note: This is a stacked 400/600 level course. The material covered will be the same for both versions of the course, but the grading will differ. To receive full credit, graduate students will be required to 1) answer all the parts of homework and exam questions; 2) make three oral presentations on assigned reading; 3) lead class discussion on assigned readings; 4) by the end of the course be able to understand and evaluate

Date	Topic	Reading	Assignment
1/15	Introduction, ocean circulation review	Pilson, Chapter 1	
1/17	Seawater properties The hydrological cycle and weathering	Pilson, Chapter 2, Libes Chapter 2, section 2.2	
1/22	Box Models and Mass balance		
1/24	Salinity and Major Ions	Pilson, Chapters 3 & 4 **TEOS 10 Primer**	Paper discussion (Ana)
1/29	Radioactive Clocks	Pilson, Chapter 10, Appendix I	HW#1 Assigned
1/31	Atmosphere-seawater interface	Pilson Chapter 5 & 13.2	
2/5	Gas exchange	Pilson Appendix D, **Wanninkhof et al. (2009)**	Paper discussion
2/7	Oxygen and redox reactions	Libes, Chapter 7; Pilson, Section 12.1	HW#1 Due
2/12	**MID-TERM EXAM #1**	Through Redox reactions	
2/14	Inorganic carbon chemistry I	Pilson, Chapter 7 & App. E-G	
2/19	Inorganic carbon chemistry II	**Doney et al. (2008)**	Paper discussion
2/21	Macronutrients	Pilson, Chapter8	
2/26	Primary Production	Pilson, Section 11.2 **Epply and Peterson (1979)**	Paper discussion
3/5	Dissolved Organic Carbon	Pilson 11.5-11.7 Hansel et al. (2009); **Hansel (2013)**	Paper discussion (Ana)
3/7	Trace Elements	Pilson, Chapter 9	
3/9	Iron Fertilization & GEOTRACES	**Boyd et al., 2007**	Paper discussion
3/11 to 3/15*	**SPRING BREAK**		
3/19*	**MID-TERM EXAM #2 (no class)**	Through Ocean Fertilization	
3/21	Particle flux	Pilson, Sections 11.1-11.3 **Martin et al., (1997)**	HW#2 Assigned Paper discussion
3/26	Phosphorous and Silicon Cycles	Paytan and McLaughlin, 2007; Libes Chapter 16	
3/28	Nitrogen cycle I	Libes Chapter 24	
4/2	Nitrogen cycle II	**Sohm et al. (2011)**	HW#2 Due Paper discussion
4/4*	Marine carbon cycle I (Recorded)	Pilson Chapter 7; Libes Chapter 26	
4/09*	Marine carbon cycle II (Recorded)		
4/11	Sediment burial and diagenesis	**Riebesell et al. (2009)** Pilson Section 13.4; Libes Chapter 12	Paper discussion
4/16	Hydrothermal systems	Pilson Section 13.3, 13.5	
4/18	Overflow and undergraduate presentations		
4/23*	Sea Ice Biogeochemistry (Recorded)	“SeaIce” book Chapter 12	