

Chem 230: Environmental Chemistry

Spring 2011

Syllabus & course overview

- Professor** Julie Fry, Chem 318, x7951, fry@reed.edu
Office hours: Monday 3-4:30 pm, Tuesday 4:30-6 pm, and by appointment
- Text** Stanley Manahan, *Environmental Chemistry*, 9th Edition
+ supplemental texts posted as e-reserves on moodle
Optional alternative readings in Colin & Baird's *Environmental Chemistry*, 4th Edition will be listed in case you prefer a more narrative textbook. Manahan will be a good reference text.
- Moodle** <https://moodle.reed.edu/course/view.php?id=798>
Look here for readings, handouts, problem sets & solutions
- Readings** Will be posted on the moodle site.
- Meets** Tuesday & Thursday 2:40-4:00 pm; ~ 50 min lecture and ~ 30 min in-class activity
- Evaluation** Weekly problem sets due Tuesdays in class
Two in-class quizzes
Midterm Exam (distributed 3/17; due 3/18) and Final Exam (TBA)
In-class presentation on an environmental chemistry topic
Breaths of Fresh Air blog entry & comments
- Problem Sets** The development of good problem solving skills is a major goal of this course, and the problem sets are a primary means to this end. Problem sets will be assigned on most Tuesdays and due before class begins on the following Tuesday. **Late problem sets will not be accepted.** The problems sets will be largely graded for effort, rather than correctness. Therefore, the student should check that each problem has been correctly solved by reference to the answer key posted on the moodle.
- Exams** There will be two exams, each covering half the course. Exams will be taken outside of class, closed-notes, closed-book. Except for previously arranged excused absences (or for documented medical or family emergencies), there will be no make-up exams.
- Presentation** Students will perform research on an environmental chemistry topic, prompted by a scientific paper, and prepare a 15-minute presentation to teach the rest of the class about that topic. A sample presentation and guidelines will be given by the instructor. **Students are responsible for material taught by their colleagues in these presentations.**
- Blog** Keep an eye out for news stories about environmental *good* news! Post one to the class blog with a bit of chemistry-related commentary (see Boardman example), and comment on at least two other posts over the course of the semester. This is an antidote to the pollution blues that can occur in this course! <http://breaths-of-fresh-air.blogspot.com/>
- Honor** You are encouraged to work with others on problem sets, but be sure that the work completed is your own. In particular, the copying of another student's assignment (or copying from any other source, for that matter) is an Honor Principle violation.

Course Outline

Unit 1: week 1 The 5 spheres of environmental chemistry; Global biogeochemical cycles; Tools of the trade: mass balance, solving “spherical cow” problems.

Unit 2: weeks 2-3 Atmospheric chemistry: gases. Stratospheric O₃ depletion, tropospheric air pollution.

Quiz 1 (2/22/11): Draw stratospheric O₃ loss and tropospheric O₃ production mechanisms

Unit 3: week 4-5 Atmospheric chemistry: particles and modeling. Atmospheric particulate matter, gas/aerosol partitioning, health effects, atmospheric modeling (gas-phase)

Unit 4: weeks 6-7 Climate change and energy

Midterm Exam (distributed 3/17/11): Units 1-4.

Unit 5: weeks 8 Soil & agricultural chemistry, fertilizer, pesticides, toxic organic compounds

Unit 6: weeks 9-10 Chemistry of natural and polluted waters

Quiz 2 (4/19/11): Water chemistry

Unit 7: week 11-12 Toxicology & Green chemistry

Unit 8: week 12-13 Mass spectrometry in environmental science

Final Exam (TBA, before 5/19/11): Units 5-8

Presentation topics: environmental chemistry topics prompted by an overview paper

Papers are posted on the moodle. Use the paper as a jumping-off point, but feel free to do your own research and take this in whatever direction you find most interesting – just keep it chemical!
(present in groups of 1-2)

Tues. 2/15/11 Satellite remote sensing of the atmosphere

Thurs. 2/24/11 Particulate Matter & health effects

Thurs. 3/10/11 Carbon wedges to combat climate change

Tues. 3/15/11 Sustainable energy by 2030

Thurs. 3/31/11 Phosphorus shortage

Thurs. 4/7/11 Ocean Acidification

Thurs. 4/14/11 Gulf oil spill, 2010

Thurs. 4/21/11 Mapping Mercury

Tues. 4/26/11 Little Green Molecules

Thurs. 4/28/11 TBA: Something related to final project on GC/MS

Sign-up for topics will happen at the beginning of class on **Thursday, Feb. 3, 2011.**