

Chem 230: Environmental Chemistry

Fall 2009

Syllabus & course overview

- Professor** Julie Fry, Chem 318, x7951, fry@reed.edu
Office hours: Monday 3-5 pm, Tuesday 3-4 pm, and by appointment
- Text** Baird & Cann, *Environmental Chemistry*, 4th Edition
+ supplemental texts posted as e-reserves on moodle
- Moodle** <https://moodle.reed.edu/course/view.php?id=318>
Look here for readings, problem set solutions, and discussion forums.
- Readings** Will be posted on the moodle site. You are highly encouraged to read these selections *before* each lecture.
- Meets** TR 1:10-2:30 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 10/15; due 10/16) and Final Exam (TBA, don't plan to depart before 12/16)
In-class presentation on an instrumental technique or Scientific American paper
- Prereq's** Chem 101/102
- 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 is responsible for checking that each problem has been correctly solved by reference to the answer key posted on the moodle. Thorough working of problem sets is one of the most important out-of-class activities for students who wish to succeed in this course.
- On Your 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.
- Exams** There will be two exams, each covering half the course. Exams will be closed-note, 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 a specific environmental chemistry topic, either an instrumental technique or a scientific paper, and prepare a 15-minute presentation to educate the rest of the class about that topic. A sample presentation and guidelines will be given by the instructor in the 2nd week of the course. **Students are responsible for material taught by their colleagues in these presentations.**

Course Outline

Unit 1: week 1 Tools of the trade, solving “spherical cow” problems, review of basic chemical concepts

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

Quiz 1 (9/22/09): 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 (10/16/09): Units 1-4.

Unit 5: weeks 8-9 Soil & agricultural chemistry, fertilizer, pesticides, toxic organic compounds

Quiz 2 (11/10/09): Draw structures of key toxic organic compounds

Unit 6: weeks 10-11 Chemistry of natural and polluted waters

Unit 7: week 12 Toxic heavy metals

Unit 8: week 13 Mass spectrometry in environmental science

Final Exam (TBA, before 12/16/09): Units 5-8

Presentation topics: literature papers or instrumental techniques.

Papers are either Scientific American papers reproduced in Baird & Cann, or additional papers posted on the moodle. Instrumentation topics are all in Baird & Cann.
(present in groups of 1-2)

1. Paper: Satellite remote sensing of the atmosphere (9/15/09, Julie presents)
2. Instr: NO_x chemiluminescence (9/17/09)
3. Paper: Particulate Matter & health effects (9/24/09)
4. Instr: Gas chromatography of atmospheric methane (10/8/09)
5. Sci Am paper: Carbon “wedges” to combat climate change (10/13/09)
6. Sci Am paper: Phosphorus shortage (10/29/09)
7. Instr: Gas chromatography/Mass spectrometry of pesticides (11/3/09)
8. Sci Am paper: Malaria and anti-malarial drugs (11/5/09)
9. Sci Am Paper: Ocean Acidification (11/12/09)
10. Instr: Ion Chromatography (11/17/09)
11. Sci Am paper: Mapping mercury (11/24/09)
12. Instr: Inductively coupled plasma mass spectrometry (ICP-MS) (12/1/09)

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