

## Chem 230: Environmental Chemistry

Spring 2013

### Syllabus & course overview

- Professor** Julie Fry, Chem 318, x7951, [fry@reed.edu](mailto:fry@reed.edu)  
Office hours: Monday/Tuesday 3-4:30 pm and by appointment
- Text** Stanley Manahan, *Environmental Chemistry*, 9<sup>th</sup> Edition  
+ supplemental texts posted as e-reserves on moodle  
Optional alternative readings in Colin & Baird's *Environmental Chemistry*, 4<sup>th</sup> 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=1622>  
Look here for readings, handouts, problem sets & solutions
- Readings** Will be posted on the moodle site in advance of each week.
- Meets** Tuesday & Thursday 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 3/14; due 3/15) and Final Exam (TBA)  
In-class presentation on an environmental chemistry topic  
Final group project
- 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.**
- 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 O<sub>3</sub> depletion, tropospheric air pollution.

**Quiz 1 (2/19/13):**      Draw stratospheric O<sub>3</sub> loss and tropospheric O<sub>3</sub> 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 3/14/13):** Units 1-4.

Unit 5: week 8      Mass spectrometry in environmental science; field experiment

Unit 6: week 9      Soil & agricultural chemistry, fertilizer, pesticides, toxic organic compounds

Unit 7: weeks 10-11      Chemistry of natural and polluted waters

**Quiz 2 (4/23/13):**      Water chemistry: Identify soil and water natural components/pollutants

Unit 8: week 12-13      Toxicology & Green chemistry

**Final Exam (TBA, finals week):** Units 5-8

### **Presentation topics: environmental chemistry topics prompted by an overview paper**

Papers are posted on the moodle under e-reserves. 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. 2/14/13**      Satellite remote sensing of the atmosphere

**Thurs. 2/21/13**      Particulate Matter & health effects

**Thurs. 3/7/13**      Carbon wedges to combat climate change

**Tues. 3/12/13**      Sustainable energy by 2030

**Thurs. 3/28/13**      Atmospheric VOC sources and sinks (for MS project)

**Thurs. 4/4/13**      Phosphorus shortage OR Global Nitrogen problem (presenter's choice!)

**Thurs. 4/11/13**      Ocean Acidification

**Thurs. 4/18/13**      Water pollution (Gulf oil spill, 2010?) or the chlorination debate

**Thurs. 4/25/13**      Mapping Mercury

**Tues. 4/30/13**      Little Green Molecules

Sign-up for topics will happen at the beginning of class on **Thursday, Jan. 31, 2013.**