

**CHEM/ENVS 380 The Chemistry Behind Environmental
Pollution**

Spring 2008 MWF 9:10 - 10:00 TH 326 3 unit

Instructor: Dr. Jane DeWitt TH 805 338-1895 dewitt@sfsu.edu

Office hours: Daily 11:00 - 12:00, by appointment and by email. Expect a minimum of a 48 hour turnaround on email requests for information.

Prerequisites: A grade of C- or better in Chem 115 or equivalent course at another college or university. A copy of a transcript for chemistry courses completed at a school other than SFSU is required to be allowed to enroll in this course. Transcripts are due by February 1.

Course Website: Course materials will be posted on the ilearn website (ilearn.sfsu.edu).

Text: Environmental Chemistry, Baird and Cann, 3rd edition (Freeman Publishing). Text website: www.whfreeman.com/envchem/3e/

Other materials: A basic scientific calculator with exponentials and scientific notation will be useful. Bring it to class for in-class activities. You do not need a graphing calculator. A Form 882-E Scantron is needed. We will use **ONE** scantron for the entire semester.

Course Description: This course tackles two areas - the chemistry that occurs in the environment, and the chemistry of pollutants that are introduced into the environment. The course strives to answer the following types of general questions:

- a. What are the major chemical processes that occur in water, soil and air?
- b. What is the fate of chemicals in the environment?
Does the chemical move in the environment?
Is the chemical transformed in the environment, and if so, into what?
How does the chemical participate in the natural processes in the environment?
- c. What needs to be known to assess the toxicity and the risk of a chemical in the environment?
- d. What can be done to remediate the chemical in the environment?

It is expected that students in this course are familiar with some fundamental chemistry topics (such as solubility, acids and bases, oxidation numbers), but new topics that pertain to the subject matter will be introduced with sufficient detail as part of the course. For example, it is expected that students are familiar with the idea of "like dissolves like" and polar and nonpolar molecules. This information, together with the new concept of

partitioning in the environment, will enable students to predict if an organic compound is mobile or immobile in the environment.

Course Organization: The course is organized around three themes:

1. *Chemistry in the Environment* addresses fundamental processes of chemistry in the natural environment in water, soil and air.
2. *Pollutants in the Environment* addresses general topics related to pollutants in the environment such as toxicity, risk, and the relationship between structure and properties of organic chemicals.
3. *Fate of Pollutants in the Environment (FPE)* address the specific fate of a class of chemical pollutants in the environment, drawing on the information presented in the *Chemistry in the Environment* and *Pollutants in the Environment* sections as background information.

We will be cycling between these three themes as we move through the course. In some cases, there will be only one lecture topic associated with a given module, and in others, there will be multiple topics.

Grading: There are 600 points possible in this course, divided as follows:

5 problem set quizzes, worth 20 pts each (100 pts total)

3 exams worth 100 pts each (300 pts total).

1 group project (described below) worth 100 pts

In-class activities and participation, worth 100 pts

No extra credit will be assigned.

Letter grades will be assigned as follows:

| | | | | |
|--------------------------|----|----------------|----|-----------|
| below 240 pts: pts: D | F | 240 - 269 pts: | D- | 270 - 299 |
| 300 - 329 pts: pts: C | D+ | 330 - 359 pts: | C- | 360 - 389 |
| 390 - 419 pts: pts: B | C+ | 420 - 449 pts: | B- | 450 - 479 |
| 480 - 509 pts: pts: A | B+ | 510 - 539 pts: | A- | 540 - 600 |

Academic honesty and Plagiarism It is expected that all of the work submitted for evaluation is the student's own work. Plagiarism is defined as the presentation of someone else's ideas, work or words as one's own, and is considered a serious breach of academic honesty. Any incidents of cheating or plagiarism will be reported to the Student Discipline Officer and no credit will be given for that assignment. The ilearn site has a link to a description of plagiarism.

Problem Set Quizzes Problem sets will be handed out on Mondays and will be due on the Friday of the following week. Material covered will be from the lecture, text and readings. You are encouraged to work in groups to solve and work on the problems, but you must formulate the answer you write down in your own words.

On the Friday that the problem set is due, you will receive a 5 question, 10 minute, multiple choice quiz on that problem set. You may use your completed problem set during the quiz. The problem set, along with the quiz, will be turned in. The quiz will be worth 15 points and the submitted problem set will be worth 5 points. If students turn in identical answers to any problems, the work will be considered plagiarized and no credit given for that problem for each student for the turned in problem set. **Late problem sets will not be accepted.**

Exams Exam material will be drawn from the lectures, readings and problem sets. Exams will be given on the dates listed in the schedule. A review sheet will be handed out prior to the exam for preparation. Any equations or physical constants needed will be provided. Students will be allowed to bring in one 5 x 7 index card with **handwritten** notes for the exam on both sides. Typed and/or photocopied notes will not be allowed. Your notes must be turned in with your exam. Make up exams will not be scheduled. The only electronic devices allowed for quizzes and exams are calculators.

Grading the Group Project The group project is a 15-20 minute presentation in one of the following areas:

1. the remediation of a chemical pollutant
2. "green" alternatives to a chemical pollutant or process

These projects must focus on a **molecule**, not on an overall strategy to minimize pollution. For example, an appropriate topic would be a discussion on the use of hydrofluorocarbons instead of chlorofluorocarbons as refrigerants to reduce ozone depletion. An inappropriate topic would be a discussion on the phase-out of aerosol cans to reduce ozone depletion. A hard copy of the presentation for each group is due at the end of the presentation. A longer description of the project will be provided separately.

In-class activities and class participation There will be in-class guided-inquiry exercises throughout the semester, with work turned in at the end of these exercises. The lowest score on these activities will be dropped. Additionally, every student will turn in a summary sheet on one presentation each day a presentation is scheduled.

Make-ups: No make-ups on quizzes, exams or in-class activities are given.

Special Needs: Any student who requires additional time for lecture exams or problem sets or any other accommodation for lecture or the course due to a disability of any sort must be registered with the Disability Programs and Resource Center (SSB 110, Phone (415)338-2472 (voice/TDD) Fax (415)338-1041; Email: drc@sfsu.edu).

Course Policies: Common Courtesy The lecture will start on time and finish on time. It is expected that students will arrive to class on time and stay for the entire period to avoid disruption of the class. Please turn off cell phones during the lecture, and please respect your fellow students and instructor by keeping conversations during class to a minimum.

Attendance Role is not taken on a daily basis and no penalty is incurred for absences or lateness, except for the fact that missed quizzes, exams or in-class activities can not be made up. Attendance is strongly recommended, as the lecture material will be the basis for problem sets and exams. Reading assignments are background for the lecture material.

Withdrawal during the 5th - 12th week: I will only approve withdrawals during this period if some change occurs during the course of the semester that makes it difficult for you to continue attending the class regularly or to continue completing assignments on time. Reasons such as not doing as well as you hoped, working too many hours (unless there was a change in your work schedule mid-semester), taking too many classes, or changing your major will not be approved.