

**Environmental Chemistry III:
Environmental Chemistry and Toxicology
CHEM 3412
Winter Quarter, 2007**

Instructor: Asst. Professor Keith Miller
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Lecture Time/Location: MWF 11:00AM – 11:55AM; Olin 103
Office Hours: By arrangement
Web Site: <http://portfolio.du.edu/>

REQUIRE COURSE ITEMS

Textbook: *Environmental Toxicology and Chemistry*, by Donald G. Crosby (available at the DU Bookstore).
Calculator: An inexpensive calculator is required. It should have the capabilities for square roots, logarithms, and exponential (scientific) notation operations. The calculator will be used for problem sets and exams. You are responsible for understanding how to perform each of the operations on your calculator.
Computer: We will use your laptop computers for at least one of the graded activities. I will inform you by email or during class meetings when your laptop will be required in lecture.

SUPPLEMENTAL COURSE ITEMS

Course Reserves: Some of the material used in lecture will be taken from additional texts and source materials. I will place them on reserve in the library and/or on Blackboard.

COURSE DESCRIPTION

This course focuses on the environmental chemistry and toxicology of industrial chemicals and materials that are released into the environment (both intentionally and inadvertently). We will first study the chemical and physical properties that govern the fate and transport of these chemicals when they are introduced into the environment. This will be followed by study of the basic toxicology of these industrial chemicals and materials. The course will also include an introduction to chemometric techniques to solve environmental problems. A significant portion of the course will be devoted to solving and/or investigating an environmental problem that is selected by each student.

LECTURE

The lecture format of class meetings will be a combination of traditional lecture format and group activities. During lecture, I will summarize new material and present illustrations and examples. In lecture, I WILL NOT identify and describe every detail you will read in the text and any supplemental materials. I will, however, emphasize the important topics covered in the reading as well as problem solving strategies when appropriate. You should stop me at any time if you have questions about the material being covered.

READING AND PROBLEMS

You are expected to complete the assigned reading prior to the class lecture. The assigned reading is listed in the tentative schedule for the course. As the quarter progresses, topics and assigned reading may change. I will inform you immediately of changes in the suggested reading assignments. Since the selected text has few problems, I will assign problems from other sources weekly. I will post an answer key one (1) week after the problems have been assigned. While you are not required to turn the completed problems in for a grade, I highly recommend that you attempt all of them. A 10% penalty will be assessed on all assignments turned in late. An additional 10% penalty will be assessed for each additional class meeting period the assignment is late.

GRADED ACTIVITIES

Three (3) activities throughout the quarter will be assigned and graded this quarter. The expected activities are detailed below, but modifications might be made during the quarter. A 10% penalty will be assessed on all assignments turned in late. An additional 10% penalty will be assessed for each additional class meeting period the assignment is late.

1. Risk assessment activity – I will assign an environmental site that requires a risk-based corrective action (RBCA). Each student will be required to perform portions of the assessment for credit. Further guidance on the project will be given later in the quarter.
2. Chemometric analysis – The project will occur in two steps. First, introductory material (typically UV or FTIR data) will be given in class for students to use basic chemometric techniques to make predictive mathematical models. Then, an application related to the contaminants in the environment will be assigned, building off of the skills learned from the first portion of the exercise. The students will use the mathematical programming language MATLAB® (or an equivalent program) for this project.
3. Individual project and presentation – Each individual will be required to complete an individual project that is related to the course, and give a presentation to the class near the end of quarter. Additional guidance will be given in the second week of the quarter.

EXAMS

A midterm exam and a cumulative final exam will be given during the quarter. Exam problems will be similar to the problems from the suggested problems. If you will be out of town for a University sanctioned function (e.g., athletic team or music group), you are responsible for making arrangements with Dr. Miller at least one week in advance to take the midterm exam early. **THERE WILL BE NO MAKE-UP MIDTERM EXAM.**

GRADES

At the end of the quarter, you will be graded according to your performance on the graded exercises, and examinations. Your final grade will be determined by the following scale:

Graded activities (1 and 2)/participation	20%
Individual Project/presentation	30%
Midterm exam	25%
Final exam	25%
Total	100%

CELLULAR PHONE AND PAGER POLICY

I respect the need for each individual to stay in contact with family and friends. The use of cellular phones and pagers, however, is disrupting to the learning environment. Thus, I request that the ringers of all cellular phones and pagers be muted during class. If an emergency arises, and you need to make a call on your phone, I request that you quietly leave the room and conduct your conversation out in the hallway.

LECTURE AND TESTING ACCOMODATIONS

I will make every effort to accommodate students diagnosed with a learning disability. I will do this in complete confidence. I do, however, request that any student requiring these accommodations inform me the first week of class. For further information, please see the University Disability Services' website at <http://www.du.edu/disability/dsp/index.html>.

ACADEMIC DISHONESTY

While I advocate collaborative learning and teamwork, I also firmly believe that each individual should maintain the highest ethical standards in all of life's endeavors. As such, I support and will strictly enforce the Honor Code of the University of Denver. For your reference, I have included the links for the Honor Code Statement and Honor Code Procedures for Students below. For further information, please see the Office of Citizenship & Community Standards' website at <http://www.du.edu/honorcode/statement.htm> for the Honor Code Statement and at <http://www.du.edu/honorcode/studentprocedure.htm> for the Honor Code Procedures for Students.

TENTATIVE SCHEDULE

Meeting	Date	Topic	Reading from Crosby (pages)
1	Jan 3	Introduction/environmental chemistry	---
2	Jan 5	Chemicals in the environment	1 – 10, 14 – 28
3	Jan 8	Chemical dynamics	35 – 47
4	Jan 10	Chemical dynamics continued	
5	Jan 12	Chemical transport	51 – 64
--	Jan 15	Martin Luther King Holiday (no class)	
6	Jan 17	Chemical transport continued	304 – 315
7	Jan 19	Chemical transport continued	
8	Jan 22	Chemometrics	handout
9	Jan 24	Chemometrics continued	handout
10	Jan 26	Chemometrics continued	handout
11	Jan 29	Transformations	68 – 88
12	Jan 31	Transformations continued	95 – 108
13	Feb 2	Transformations continued	
14	Feb 5	Review/catchup	
15	Feb 7	Midterm exam	
16	Feb 9	Individual project work day	
17	Feb 12	Toxicology: Dose-response relationship	122 – 126
18	Feb 14	Toxicology: Dose-response relationship (continued)	143 – 156
19	Feb 16	Exposure and Risk	185 – 199, handout
20	Feb 19	Exposure and Risk (continued)	
21	Feb 21	Exposure and Risk (continued)	
22	Feb 23	Individual project work day	
23	Feb 26	Class exercise: risk assessment	handout
24	Feb 28	Industrial chemicals	245 – 260, handout
25	Mar 1	Chemical production	handout
26	Mar 5	Refractory chemicals and materials	261 – 276, handout
27	Mar 7	Reactive chemicals and materials	281 – 298, handout
28	Mar 9	Case Study: Bhopal	
29	Mar 12	Presentations/Review	
30	Mar 14	Final – Time (to be determined)	