ChE 364 CHEMICAL PROCESSING AND THE ENVIRONMENT

Spring 2002

Instructor: Linda Broadbelt, Room E160, 491-5351, broadbelt@northwestern.edu
Office Hours:

Objectives: This class will focus on the application of chemical engineering fundamentals to environmental problems. The fundamentals underlying chemistry and mechanisms, chemical reaction and rate and transport will be stressed. The class will be centered around four major subtopics, air, water, soil and risk assessment and analysis, and associated examples from the Chemical Process Industry (CPI). The course will integrate the impact of current processes and the associated cleanup methods with the development of strategies for more environmentally benign processes. This class also attempts to increase students' awareness of current environmental issues and potential solutions through presentation of weekly bulletins from current newspapers, magazines or journals.

Prereqs: The concepts of equilibrium staged separations from ChE 212 will be used extensively in conjunction with thermodynamic concepts of phase equilibria from ChE 211. Kinetics and reactor design must at least be taken concurrently.

Course Structure:

Lectures: M,T, W, F, 11 am

Homework: Approximately one homework set will be assigned each week. A total of about 6 assignments will be made. The TA will grade the homework.

Teaching Assistant	Email
Maria Curet-Arana	curetarana@northwestern.edu

Homework Policy. Homework is due **at the beginning of class** on the designated day. Late papers receive zero credit. Homework solutions will be on reserve in the Science and Engineering Library. TA office hours should be the primary forum for questions about the homework, and for settling all homework grade disputes.

You are expected to produce your own homework solutions. You may discuss the homework with and seek the help of fellow students, provided you do not end up copying solutions. Please cite sources other than the course textbook used in your solution at the point of use. This includes books, journal articles and significant help from others.

Exams: There will be two 50 minute exams. There will be no final exam.

Exam 1: Monday, April 29, 11 am.
Exam 2: Friday, May 24, 11 am.

- Cheating in exams is a serious offense. In addition to receiving an automatic failing grade, offenders will be punished to the full extent allowed by university regulations.
- If you are unable to take an exam, inform me immediately (before the exam if possible).

Grading: Course grades will be determined based on the following scale:

Exam I:	30%
Exam II:	30%
Homework:	25%
Class participation:	15%

- The professor will grade exams and handle all associated grading disputes.
- The teaching assistant will grade homework and settle homework grading disputes.

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Tentative Course Schedule:

Week 1	4/2	Course introduction.
	4/3	**AIR**: Air pollutants.
	4/5	Overview of air quality legislation.
Week 2	4/8	Combustion fundamentals. (LJB has jury duty)
	4/9	Atmospheric chemistry.
	4/10	Atmospheric chemistry.
	4/12	Refrigerants.
Week 3	4/15	Chlorofluorocarbon replacement.
	4/16	Pollutant destruction.
	4/17	Pollutant removal
	4/19	Pollutant removal.
Week 4	4/22	Aerosols
	4/23	Aerosols
	4/24	Particle removal
	4/26	Particle removal

Week 5	4/29	**Exam I**
	4/30	**SOIL**: An overview of solid waste issues.
	5/1	Life cycle analysis.
	5/3	Life cycle analysis.
Week 6	5/6	Polymer resource recovery.
	5/7	Polymer resource recovery.
	5/8	**WATER:** Ion exchange.
	5/10	Coagulation and flocculation.
Week 7	5/13	Membranes and reverse osmosis.
	5/14	Waste minimization through process flowsheeting
	5/15	Design of unit operations for minimizing waste.
	5/17	Design of unit operations for minimizing waste.
Week 8	5/20	Identifying pollutants from industrial sites.
	5/21	Identifying pollutants from industrial sites.
	5/22	
	5/24	**Exam II**