

**ENVIRONMENTAL CHEMISTRY AND BIOLOGY
CIVIL ENGINEERING 540**

**DR. LANCE LIN
SPRING 2013**

LECTURE DAY/TIME/ROOM	TR/14:00 – 15:15/ESB 449
OFFICE	ESB 651A
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OFFICE HOURS	Wed. 9AM-12PM or By appointment

COURSE DESCRIPTION:

This course is designed for graduate students and undergraduate senior students with basic knowledge of chemistry and microbiology. We will cover various aspects of chemical and microbial processes relevant to the chemical fate, pollution, and environmental remediation. The topics will have an emphasis on fate and transport of chemicals (pollutants) in the environment, engineering solutions for environmental remediation, and use of contemporary environmental issues as case studies. In addition, basic principles of green chemistry and its applications will be discussed.

COURSE GOALS:

The goals of the course are for students to

1. Be familiar with role of chemistry and microbiology in governing environmental processes and sustainability
2. Learn basic chemical and microbial processes governing environmental fate, pollution, toxicity
3. Learn fundamental principles and technologies for environmental remediation
4. Learn the basic principles of greenchemistry and industrial ecology

RECOMMENDED TEXT:

- Stanley E. Manahan (2010). Environmental Chemistry 9th ed., CRC Press, Taylor & Francis Group.

CLASS POLICIES:

Statement on Academic Honesty

Any student who misrepresents the work of others as his or her own will receive an “F” for the semester and will be referred to the appropriate Chairperson and/or Dean for disciplinary action.

Lecture

Lectures will cover the subjects/topics listed in the table on next page. Contemporary environmental issues will be used as case studies in which the lecture materials will be applied. Attendance will not be formally monitored during lecture periods. However, attendance and

class participation will be considered in the evaluation of a student's desire to learn and final grade.

Homework

Homework assignments will be given during the semester. Homework will be collected in regular class on the due days. Homework grade will be reduced by 10% for each day past the due day.

Exams

Two exams will be given during the regular semester. Examinations may be in class, take home or a combination of both.

Project Research and In-class Presentation

In addition, students are to conduct literature on a relevant topic. As the end of the semester, each team will submit a report on their research and give a presentation to the class.

Grading

Grades will be calculated according to the weighting factors listed in the following table.

Homework	40%
Exam 1	20%
Exam 2	20%
Project Presentation	20%

TENTATIVE COURSE TOPICS (SUBJECT TO CHANGE AT THE DISCRETION OF THE INSTRUCTOR):

- A. Introduction to Environmental Chemistry/Biology**
- B. Aquatic Chemistry**
 - Fundamentals
 - Redox reactions
 - Phase interactions
 - Microbial Biochemistry
 - Water pollution
- C. Bioelectrochemistry**
 - Fundamentals of electrochemical systems
 - Bioelectrochemical systems and applications
- D. Atmospheric Chemistry**
 - Fundamentals
 - Pollutants (particles, inorganics, organics)
 - Endangered global atmosphere
- E. Green Chemistry and Industrial Ecology**
 - Fundamentals
 - Resources and sustainable materials/energy
 - Hazardous wastes, minimization/utilization/treatment