CEE 756: Environmental Chemistry

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Office hours: Tuesday afternoons, 2-4 pm. Also by appointment. Appointments may be scheduled by e-mail.

Course Topics
This course provides an overview of environmental chemical kinetics and transformations as they apply to the practice of environmental engineering and science. After completing this course, you will be familiar with the quantitative treatment of organic and metallic pollutants in environmental systems, chemical kinetics, applied redox chemistry in natural and engineered systems, surface reactions, and photochemical transformations.

Course Approach and Objectives
There are two fundamental questions to answer when quantitatively assessing environmental chemistry problems: “Will it happen?” and “How fast will it occur?” This distinction is the difference between chemical equilibrium and chemical kinetics. As graduate students interested in environmental engineering or environmental science, you probably got a decent overview of chemical equilibrium processes in your basic aquatic chemistry course that focused on acid-base and redox equilibrium of inorganics. Your next step on the road to understanding involves some knowledge of chemical kinetics, which will hopefully be provided by this class. This class will bring you into the world of environmental organic chemistry, focusing on the effect of structure on physical behavior in the environment and the quantitative analysis of environmental chemical kinetics as it relates to transformation processes in the environment. While this course is designed for environmental engineers, a wide variety of students interested in environmental chemistry would benefit from it, as the fundamental concepts and theories are not specific to engineered processes, but are universal. The skills you will learn in this class can then be applied to understand the vast majority of chemistry issues associated with contaminant fate and transport, transformation processes, and the design and optimization of engineered systems.

Prerequisites
You should have completed courses such as CHEM 220A: Organic Chemistry, and CEE 458-658: Fundamentals of Environmental Chemistry, to be fully prepared for this course. However, graduate students lacking these prerequisites can still succeed in this course, but may require some extra reading and study outside of class.

Grading
Exams (2) = 50%
Grades are based on knowledge and application of the course materials and concepts. Students receiving: “A” grades thoroughly understand all of the course work and its applications, while “B” grades understand all of the major concepts and most of the minor ones. Grades lower than a B are not expected for any students who are doing the required work and maintaining pace with your peers. Plus/minus grading is used. As graduate students, I expect that grades will not be very important to you, only your understanding of the course material is important to your continued intellectual growth.

**NOTICE:** At the end of the semester, all grades are final. If an error was made in the determination of your grade, it will be corrected. Your grade in this course is based entirely on your performance on the exams and homework assignments. If you are having trouble with material in this course, please come and talk to me. If you need help, ask me and study with your classmates. You will NOT have the opportunity to complete additional work at the end of the semester to improve your grade.

**Homework**

- Homework will normally consist of problem sets that are routinely assigned. If a student performs poorly in this course, it is usually because they chose to neglect their homework.

- It is acceptable to discuss homework with classmates, however, copying homework from classmates is unacceptable and may merit disciplinary action. Please confine homework discussions to approaches to problems. In general, homework is not worth all that much relative to exams, so the more you rely upon the expertise of classmates to develop homework solutions, the more difficult the exam will seem to be for you. Struggling with homework problems may take more time and effort, but often the reward for such perseverance is better performance on exams. Choose wisely.

- All assignments are to be handed in at the beginning of class on the due date, generally Wednesdays. Assignments must be submitted in class, not to the instructor’s office or mailbox. Speak to me if you feel your assignment will be late for any reason.

- If the class period in which an assignment is due is canceled, the assignment will be due at the beginning of the next class period.

**Exams**

- One in-class exam is scheduled approximately every 5-6 weeks. The exact date of each exam will be announced as the class progresses, at least a one week in advance.

- **If the class period in which an exam is scheduled is canceled, the exam will be given during the next class period.**

- The in-class exams typically cover material not covered on the previous in-class exam. The final exam is cumulative.

- Exams will be difficult. Exams test coursework, along with the student’s approach, logic, analytical and problem solving skills. Exams may cover materials in the text book, lecture material, and handouts. There is never enough time.
Attendance

Attendance is expected in class, and your performance in the class will benefit from attending all lectures. **In accordance with university policy, any student may be dropped from the course for non-attendance upon indication of the instructor.** If you know that you will be missing a class period, please let me know in advance.

Textbook and Course Materials

2. Supplemental handouts and notes.

Expectations for Students

1. Turn off your cell phone before each and every class, and pray that I don’t know who you are if such a distraction occurs.
2. No food or drink is to be brought into the classroom if it will cause a distraction (slurping, rustling, etc.)
3. No talking with classmates during class, or other behavior that will cause a distraction.
4. Questions, class participation, and discussion of class concepts during class are strongly encouraged and will be rewarded.
5. Behavior towards fellow students and the professor must be respectful and tolerant.
6. Students with disabilities may contact the instructor.

Academic Standards for Students

*The following guidelines will be strictly enforced.*

Every student enrolled at the University of Nevada, Reno agrees to abide by, and make every effort to meet, the academic and behavioral standards of the university. The maintenance of academic standards is a joint responsibility of the students and faculty of the university. Freedom to teach and to learn are dependent upon individual and collective conduct to permit the pursuit and exchange of knowledge and opinion. Faculty have the responsibility to create an atmosphere in which students may display their knowledge. This atmosphere includes an orderly testing room and sufficient safeguards to inhibit dishonesty. Students have the responsibility to rely on their knowledge and resources in the evaluation process. The trust developed in the maintenance of academic standards is necessary to the fair evaluation of all students.

**Academic dishonesty** is against the university standards as well as the system community standards. Academic dishonesty is defined as cheating, plagiarism, or otherwise obtaining grades under false pretenses. Plagiarism is defined as submitting the language, ideas, thoughts, or work of another as one’s own; or assisting in the act of plagiarism by allowing one’s work to be used in this fashion. Cheating is defined as: (1) obtaining or providing unauthorized information during an examination through verbal, visual, or unauthorized used of books, notes, text, and other materials; (2) obtaining or providing information concerning all or part of an examination prior to that examination; (3) taking an examination for another student, or arranging for another person to take an exam in one’s place; (4) altering or changing test answers after submittal for grading, grades after grades have been awarded, or other academic records once these are official.
Disciplinary procedures for incidents of academic dishonesty may involve both academic action and administrative action for behavior against the campus regulations for student conduct. The procedures involve the determination by the faculty member pursuing concerns over alleged cheating or plagiarism as to whether administrative action is warranted, in addition to making a determination as to any academic consequence. Academic action may include: (1) canceling the student’s enrollment in the class without a grade; (2) filing a final grade of “F”; (3) awarding a failing grade on the test or paper in question; (4) requiring the student to retake the test or resubmit the paper.

If the student wishes to appeal the academic action of the faculty member, a special hearing board will be constituted to investigate the incident and determine whether the student is responsible for dishonesty and, if so, the appropriate academic action as a consequence for this act. The student will be entitled to receive notice of the academic charges and the opportunity to reply to or to rebut the charges before an unbiased board.

**Tentative Course Outline**

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<tr>
<td>1</td>
<td>Introduction, Atomic Structure</td>
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<td>Natural Organic Matter, Speciation</td>
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<td>Covalent Bonding, Organic Compounds</td>
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