CEE 5984 SS: Organic Chemistry of Environmental Contaminants

Spring 2008
Time and location: MWF 11:10-12:05; Patton 207
Instructor: Dr. Peter Vikesland, 415 Durham Hall, pvikes@vt.edu, (540) 231-3568
Office Hours: Thursdays 1:00-3:00; other times by appointment
Web address: Class notes, class problems, reading assignments, and homework solutions will be posted on the Blackboard website. Students should check the website prior to class to check for handouts/discussion materials.

This course focuses on the processes affecting the fate and transport of organic chemicals within natural and engineered systems. Students will gain a fundamental understanding of thermodynamic principles and will then utilize that information to predict intermolecular interactions. The course concludes with an introduction to environmental chemical transformation pathways.

Textbooks: Environmental Organic Chemistry (2002) 2nd Edition by R.P. Schwarzenbach, P. M. Gschwend, and D. M. Imboden; Wiley-Interscience. (Required text)

Reaction Mechanisms in Environmental Organic Chemistry (1994) by R.A. Larson and E.J. Weber; Lewis Publishers.
(supplemental text)

Course Format: The class will be taught interactively. Both lectures and in-class activities will be used to create an active learning environment. A tentative course outline is attached. Homework will be assigned bi-weekly and may be completed by small groups (1-3 people). However, each individual is responsible for a complete understanding of the homework assignment. There will be three exams. The exams will be take-home and will be open note/open book.

Grading Policy: The course grade will be determined using the following distribution: 30% homework, 15% class lecture, 10% class participation, and 45% for exams. The class will be graded on the following scale: (A) 94-100; (A-) 90-93; (B+) 87-89; (B) 84-86; (B-) 80-83; (C+) 77-79; (C) 74-76; (C-) 70-73; (D+) 67-69; (D) 64-66; (D-) 60-63; (F) <60.

Lecture Assignment: One time during the latter part of the semester each student will be expected to present a 50-minute lecture based on material either from the textbook or from material of the student's choice. Following this lecture, the student will develop one homework problem and one exam problem. Additional details are forthcoming.

Tentative Course Outline

Week #	Topics for the Week	Reading Assignment SGI = Schwarzenbach, Gschwend, and Imboden (2nd Edition)
1	Introduction to Environmental Organic Chemistry	SGI Chapter 1 and Chapter 2
	Introduction to Partitioning	SGI Chapter 3
2	Introduction to Partitioning	SGI Chapter 3
	Vapor Pressure	SGI Chapter 4
3	Vapor Pressure	SGI Chapter 4
	Activity Coefficient and Solubility	SGI Chapter 5
4	Activity Coefficient and Solubility	SGI Chapter 5
	Air-Organic Solvent and Air-Water Partitioning	SGI Chapter 6
5	Air-Organic Solvent and Air-Water Partitioning	SGI Chapter 6
	Exam #1: Chemical Partitioning (tentatively scheduled for February 15)	
6	Organic Liquid-Water Partitioning	SGI Chapter 7
7	Organic Acids and Bases	SGI Chapter 8
8	Sorption I – Sorption Involving Organic Matter	SGI Chapter 9
9	Sorption III – Sorption to Inorganic Surfaces	SGI Chapter 11
	Exam #2: Chemical Partitioning (tentatively scheduled for March 21)	
10	Chemical Transformation Reactions	SGI Chapter 12
	Thermodynamics and Kinetics Hydrolysis	SGI Chapter 13
11	Chemical Transformation Reactions Redox Reactions	SGI Chapter 14
12	Photochemical Transformations Basic Principles Direct Photolysis	SGI Chapter 15
13	Photochemical Transformations Indirect Photolysis	SGI Chapter 16
14	Biological Transformations	SGI Chapter 17
15	Biological Transformations	SGI Chapter 17
	Exam #3: Chemical Transformation Processes (currently scheduled for Final Exam Week)	

Honor System: *All aspects of the coursework for this class are covered by the University Honor System. As noted, the **homework** may be completed by small groups (1-3 people), however, each individual must sign the submitted copy of the homework. By doing so they attest that they contributed in some manner to the final product. Students are encouraged to review the Honor Code and Honor System as described in either the Undergraduate Course Catalog and Academic Policies Handbook or in the Graduate Policies and Procedures Handbook.*