

CHEM 3360 / TOX 3360 Environmental Chemistry and Toxicology

Course Outline: Winter Semester 2006

Tentative Outline – until a final outline has been posted, it must be noted that both the in-class midterm date and the lecture material may be changed without notice.

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Office Hours: Please contact me at any time
Lecture Times: Tu, Th 8:30-9:50 in Mack Room 116

Course Description: The chemistry of the natural environment; the influence of pollutants upon the environment, including methods of introduction of pollutants to and removal of pollutants from the environment. Credit weighting = 0.50.

Students with standing in CHEM 1310 may not take this course

Text: Environmental Chemistry, 2nd Ed., 1994 by Nigel J. Bunce, available at the U of G Bookstore. You may optionally purchase the Answer Guide to the problems.

Other References: Additional reference material will be required throughout the course. These materials and/or their source of information will be posted as required.

Evaluation:

An in-class midterm test	25
An opinion paper (5-10 pages) ¹	20
Guest lecturer reviews ²	20
Final examination (2 hours)	35

Additional details will be available on the CHEM/TOX 3360 web site. See www.chembio.uoguelph.ca and follow the link to CHEM/TOX 3360 for Martos. Each student is required to complete a write-up (opinion paper) on an assigned topic, write four review papers, one for each of the Guest Lecturers, and write a midterm and a final examination encompassing the entire course, but with some emphasis towards the latter part of the course content. Students are highly encouraged to complete all assigned problem sets and review all reference materials for the test, papers and final examination.

¹ Topics will be randomly assigned to each student.

² Guest lecturers are professionals working on environmental issues from the perspective of chemical, toxicological and/or regulatory perspectives.

Problems / Assignments: Numerical problems will be assigned week-by-week. Most will be from the textbook. I strongly recommend working the problems in small groups; be sure to ask for help if you are having difficulty.

Exams: These will comprise a combination of short answer and numerical questions.

Lecture Notes: Transparencies will be used in class. These will be available on the class web site. In addition, you will be required to learn one complete topic from the textbook, on your own, and will also be expected to test on it.

Week	Date (2006)	Topic
1	10-Jan	Introduction: Perspectives on Air, Water, Soil, Thermal Pollution.
	12-Jan	Thermodynamic and kinetic concepts relevant to environmental chemistry, the atmosphere; environmental cycles and residence times
2	17-Jan	Temperature profile of the atmosphere; greenhouse gases and climate change; Kyoto accord; ozone balance in the stratosphere
	19-Jan	Chlorofluorocarbons; Montreal protocol; CFC replacement compounds
3	24-Jan	Pollution in the troposphere: nitrogen oxide cycle; formation of the hydroxyl radical
	26-Jan	<i>Guest Lecturer</i>
4	31-Jan	Photochemical smog
	2-Feb	<i>Guest Lecturer</i>
5	7-Feb	Secondary pollutants; air toxics. Particulate matter in the lower atmosphere
	9-Feb	Radioisotopes in the environment and indoor air (spaces you live and work in)
6	14-Feb	Dissolved gases in natural water: O ₂ , CO ₂ ; Partitioning of chemicals (natural and pollutants) to and from water (water as a sink)
	16-Feb	Dissolved solids in natural water: alkalinity and hardness; water softening
7	21-Feb	Reading Week
	23-Feb	
8	28-Feb	In class test: material up to and including February 16
	2-Mar	<i>Guest Lecturer</i>
9	7-Mar	Alternatives to chlorination
	9-Mar	Commercial and home use of chemical-based products and their current scrutiny by Environment and Health Canada (23,000 new substances waiting clearance for use in Canada alone). Sewage and waste treatment
10	14-Mar	Chlorine and its compounds
	16-Mar	PCBs and dioxins: chemistry and sources; toxicity.
11	21-Mar	PCBs and dioxins: toxic equivalency factors; Phase I/Phase II metabolism. Pesticides and pathogens in the environment.
	23-Mar	Brominated diphenyl ethers; endocrine disrupting compounds; pulp and paper industry; PFOAs
12	28-Mar	Metals
	30-Mar	<i>Guest Lecturer</i>
13	4-Apr	Metals
	6-Apr	Review class
24-Apr		Final examination (whole course): 2 hours