Chemistry of Environmental Change – CHM 210F

CHM210 is an introductory course in environmental chemistry. It covers the chemistry of the air and water, with specific attention given to stratospheric ozone, air pollution, the chemistry of the global atmosphere, the chemistry of natural waters, water pollution and treatment, toxic metals, and biogeochemical cycles. CHM310, which is a complement to CHM210, addresses climate change, the chemistry of energy sources, and toxic organics. Together, CHM210 and 310 provide an intensive introduction to the field of environmental chemistry but they stand alone, i.e. one is not the prerequisite for the other. In both courses, there is a focus on the fundamental chemistry driving environmental phenomena, and so we will use a number of topics you learned in first-year chemistry (e.g. kinetics, thermodynamics, electrochemistry). CHM210 is lecture based, with a one-hour weekly tutorial. There are two goals to the tutorial. One is to consolidate concepts introduced in class, i.e. the TA will review these concepts and answer questions. The second is to provide an opportunity for you to read and discuss interesting articles in the field that will have been assigned previously.

Prerequisites

CHM135H (formerly CHM139H)/CHM151Y, (MAT135H, MAT136H)/MAT137Y

Schedule

Lectures: Tues/Thurs, 2 to 3 pm, GB221
Tutorials: Friday at 12 noon, 2 pm, 3 pm LM155

Grading

Problem Sets (3 in number, due by the end of lecture)[1]	15%
Mid-term (Tuesday October 24, during class time, closed book, location EX300)[2]	20%
Tutorial quizzes (held each tutorial, two lowest scores dropped)[3,4]	15%
Final Exam	50%

NOTE #1: No credit will be given for problem sets that are late unless there is a medical (or equivalent) justification, in which case the other scores are pro-rated

NOTE #2: If you miss the mid-term, an official medical (or equivalent) justification is required to not lose credit. A make-up test is not given; rather, your scores on the other required elements in the course are pro-rated.

NOTE #3: Pre-assigned articles and lecture material will be quizzed. The quizzes are not difficult; their goal is to insure that you are keeping up in the course.

NOTE #4: If you miss quizzes due to a documented medical (or equivalent) reason, I will reduce the required number of quizzes, and average the available scores. Note that we discount the two lowest quiz scores.

Contact Information for Jon Abbatt

Office: Lash Miller 324; Tel: 946-7358
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Office hours: to be arranged

NOTE: Please contact me if you have any questions. Conceptual issues are best handled in person (either before or after class, at office hours, or by special appointment) but if you have short questions email is often more efficient.

Contact Information for Teaching Assistants

Megan Willis: megan.willis@mail.utoronto.ca
Sarah Kavassalis: skavassa@chem.utoronto.ca

Course Announcements

Important course announcements will not necessarily be made on Blackboard but will certainly be made in class. As an example, advice on how to solve a problem set question will be given in class but not on Blackboard.

Textbook

Environmental Chemistry, Colin Baird and Michael Cann, Fifth Edition, W.H. Freeman and Co.

You are responsible for material covered in class, not additional material that may be in the textbook. However, the textbook is an excellent complement to lecture material; indeed, some of the lecture material is closely tied to the textbook. I indicate below the sections of the textbook directly related to the different parts of the course. **I strongly encourage you to read the textbook to provide the broadest learning experience.** Note that we are **not** covering the Green Chemistry sections of the book.

Academic Integrity

Discussing course material and assignments with others in the class can be a valuable learning experience; I encourage it. **However, any material that you submit must be your own, independent work. It is plagiarism to submit a problem set that contains material copied from another student**. Please consult the following website on academic integrity: http://www.artsci.utoronto.ca/osai/

Some advice

You will likely do well in this course if you come to all the lectures, read along in the textbook, prepare for tutorial, and approach me or the TAs with questions that arise. The material in the course is not especially challenging at the conceptual level but we are going to cover a lot of ground, and so a last-minute studying effort will likely not be successful.

Topics

1. **Introduction**
   - Origins of our physical environment (1 lecture) - *no reading*
2. **Chemistry of the atmosphere, and biogeochemistry**
   - Introduction (l lecture) – *Chapter 1.1 to 1.2*
   - Stratospheric ozone (2 lectures) – *Chapters 1 and 2 (not 1.6, 1.7)*
   - Oxidation chemistry and urban air (4 lectures) – *Chapter 3.1 to 3.11*
   - Acid rain (1 lecture) – *Chapters 3.18 to 3.21, 4.2 to 4.8*
   - Atmospheric aerosol (1 lecture) – *Chapters 3.22 to 3.25, 4.1, 4.9 to 4.11*
   - Biogeochemical cycles (1 lecture) – *no specific sections from B and C*
3. **Chemistry of natural and polluted waters in the environment**
   - Introduction (1 lecture) – *Chapter 10.1 to 10.3*
   - Oxidation-reduction chemistry (2 lectures) – *Chapter 10.4 to 10.13 (not 10.7)*
   - Acid base chemistry (2 lectures) – *Chapter 10.14 to 10.17, 10.21 to 10.23*
   - Water treatment strategies (1 lecture) – *Chapter 11.1 to 11.14*
4. **Metals in the environment**
   - Heavy metals (2 lectures) – *Chapter 12.1 to 12.24, plus a bit on Arsenic*
   - Radionuclides (1 lecture) – *Chapter 9*
5. **Special topics**
   - Indoor air chemistry (1 lecture, if I have time) – *Chapter 4.12 to 14.18*
   - Arctic chemistry (1 lecture, if I have time) – *no reading*