

ENV233: Earth System Chemistry

Winter 2017

Schedule

Lecture: Tues 10-12, in SS 562

Tutorial: Wed 10-11, in SS 562

Office hours: 1:30-3:30 pm on Tuesdays in room ES2121 (GH)
1:30-3:30 pm on Wednesdays in room LM119 (JD)
or by appointment

Contact Information

Prof. Grant Henderson, (416) 978-6041, henders@es.utoronto.ca

Prof. Jessica D'eon, (416) 978-7283, jessica.deon@utoronto.ca

Course Overview

This course will examine how the chemistry of the Earth System has changed through geologic time including recent perturbations by humans. Within this scientific context, students will understand that the chemistry of the Earth System has changed dramatically due to both biological and abiotic forcings and that change is normal. The second half of the course will discuss the effects of recent human perturbations to the chemistry of the Earth.

Course website

All material including presentation slides and literature resources, when provided, will be available on Blackboard. You are responsible for checking this site regularly for announcements and content.

Textbook

We will be using *The Earth System* by Lee Kump, James Kasting, and Robert Crane throughout the semester as a resource for content and questions.

GH Assignments

There will be 4 mini assignments each consisting of 3-4 questions based on the "review" and "critical thinking questions" at the end of the chapters in the textbook.

Montreal Protocol Project

The Montreal Protocol resulted from a meeting in 1987 that set in place controls on the use of chlorofluorocarbons (CFCs) in an effort to protect stratospheric ozone. It is one of the most successful pieces of environmental legislation to date, and remains relevant as these compounds are also potent greenhouse gases. Through two assignments we will explore ozone chemistry in the stratosphere and how CFCs can affect both the ozone layer and climate. You will then use the scientific knowledge generated by these assignments to write a scientific brief detailing your findings.

Proposed Grading Scheme:

GH Assignments (1-4)	15%
Montreal Protocol Project	30%
MP Assignment 1	10%
MP Assignment 2	10%
MP Writing Assignment	10%
Test	15%
Final Exam	40%

Lecture Schedule

Date		Lecture or Tutorial Topic	Due Dates
January	10	T G1 Introduction and Ch 7: Circulation of the Solid Earth: Plate tectonics	
	11	W Tutorial	
	17	T G2 Ch 10: Origin of Earth and of life	
	18	W Tutorial	
	24	T G3 Ch 11 and 12: The atmosphere and the Effect of life	
	25	W Tutorial	
February	31	T G4 Ch 13: Biodiversity through Earth's History	GH Assignment 1
	1	W Tutorial	
	7	T G5 C17: Ozone depletion	GH Assignment 2
	8	W Tutorial	
	14	T G6 Ch 19: Climate stability on Earth and Earth-like planets	GH Assignment 3
	15	W Tutorial	MP Assignment 1 GH Assignment 4 (Feb 17)
	21	T Reading Week	
	22	W Reading Week	
	28	T Test – Prof. Henderson Material	
	March	1	W J1 Ch 8: Box models and the organic carbon cycle
7		T J2 Ch 8: Box models and the organic carbon cycle (2)	
8		W Tutorial	
14		T J3 Ch 2, 3, 14: The greenhouse effect and climate feedback cycles	
15		W Tutorial	
21		T J4 Ch 8, 15, 14: The inorganic carbon cycle and climate change	
22		W Tutorial	MP Assignment 2
28		T J5 Ch 8: Nutrient cycling and electrical potential energy	
April	29	W Tutorial	
	4	T J6 Ch 4, 5: Global circulation	
	5	W Tutorial	MP Writing Assignment

Academic Integrity

While I encourage you to discuss your understanding of course material with others, any material that you submit or present **MUST** represent your own independent work and comprehension. Information about academic integrity can be found here: <http://www.artsci.utoronto.ca/osai/>

Accommodations

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability or health consideration that may require accommodations, please feel free to approach me and/or Accessibility Services at (416) 978 8060; <http://accessibility.utoronto.ca>

Absences

Students who miss a test or assignment deadline should contact Prof. Henderson or Prof. D'eon as soon as possible, and no later than one week after returning to class. A legitimate reason for an absence or missed deadline due to medical, personal, or family reasons should be documented by one of the following: 1) U of T Student Medical Certificate; 2) Student Health or Disability Related Certificate; 3) College Registrar's Letter; or 4) Accessibility Services Letter. In the absence of a legitimate reason for missing a test or assignment you will receive a grade of 0 on the test, and a deduction of 10% per day (including weekends) will be applied to the assignment.