Physical & Environmental Sciences
UNIVERSITY OF TORONTO
SCARBOROUGH

EES1105 Soil Contamination Chemistry
Winter Term 2020
Lecture: Tuesdays 10am-12pm in Room IC328, UTSC Campus
Instructor: Professor M.J. Simpson
Office: Room SY322
Email: myrna.simpson@utoronto.ca
Office Hours: to be announced and by appointment

COURSE DESCRIPTION

This course presents fundamental chemical concepts and reactions that occur in soils with emphasis on contaminant behaviour. The basics of soil chemistry will be introduced and the processes that relate to: quantities, attenuation, sequestration, and movement of ions, heavy metals, and organic molecules in terrestrial environments will be addressed in detail. Students will become familiar with geochemical computer models and these models will be used to predict the behaviour of ions in soil. Soil chemical characteristics, which can be used to predict the fate of contaminants in terrestrial environments, will also be presented.

COURSE PREREQUISITES

Students should have a strong foundation in chemistry and environmental sciences. It is highly recommended that students wishing to take this course should have completed: Introduction to **Soil Science** (EESB05 or equivalent), **one full year of General Chemistry** (CHMA10 and CHMA11 or equivalent), and Introduction to **Environmental Chemistry** (CHMB55 or equivalent).

EVALUATION

Assignments (3 in total)	**45%**
Term Project Outline	**10%**
Term Project Research Paper (Due:)	**45%**

Assignments: three assignments will be given throughout the course to help students become proficient with course materials. Assignments will be provided after the appropriate course material has been covered and typically students will have 2 weeks to complete the assignment.

Term Project Research Paper: students are required to submit a term project research paper no later **5pm on Monday, April 20, 2020**. Students who plan on convocating in June 2020 will be required to submit their term project research paper by **April 10, 2020.** This term paper should be approximately 25 pages in length (using 12 point font and 1.5 line spacing; including all references, figures and tables). More detail about the term project research paper will be given in February. Students will be required to submit a detailed outline for feedback (also worth 10%) of the final grade.

Evaluation will be carried out in accordance with the Graduate Grading and Evaluation Practices Policy (and how that policy is interpreted and applied in this Dept.) http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/grading.pdf

TEXTBOOK RESOURCES

Detailed lecture notes will be provided and discussed in class. For more information, students may use textbook resources which are available on **course reserves in the UTSC library** as a supplement to the lecture material.

"Environmental Soil Chemistry", second edition. 2003. D. L. Sparks. Academic Press.

"Soil Chemistry", second edition. 1985. H. L. Bohn, B. L. McNeal, and G. A. O'Connor. Wiley.

If you need further background information on soil science, a good text is: "Elements of the nature and properties of soils", 4th edition. 2019. N.C. Brady and R. R. Weil. Prentice Hall.

LECTURE NOTES

Lecture notes are available in .pdf format via the course page on Quercus.

TENTATIVE LECTURE SCHEDULE

Date	Lecture Topic
January 7	-Introduction to chemical processes in soil environments -Soil solution and solid phase equilibria
January 14	-Soil solution and solid phase equilibria (continued) -Soil minerals and soil organic matter chemistry
January 21	-Soil minerals and soil organic matter chemistry (continued)
January 28	-Sorption phenomena in soils and kinetics of chemical processes
February 4	-Ion exchange processes in soil
February 11	-Chemistry of saline and sodic soils
February 18	*Reading week – no lecture*
February 25	-Fate of organic chemicals in soil
March 3	-Fate of organic chemicals in soil (continued)
March 10	-Methods of analysis used to assess soil contamination
March 17	*Term project outline feedback and discussion*
March 24	-Fate of metals in soil
March 31	-Fate of pesticides in soil
April 20*	***Term Project Research Paper Submission Deadline***

*Students who plan on convocating in June 2020 will be required to submit their term project research paper by April 10.

LATE WORK

Students are expected to submit work on time and late work will not be accepted. If students have a medical reason for being unable to submit work by the given deadline, medical documentation must be provided as soon as possible and requests for an extension must be made via email.

COURSE EMAIL POLICY

Email inquiries regarding course materials are not recommended because email is not an efficient way of learning. If you have questions, please see the instructor during office hours or make an appointment outside of office hours.

EMERGENCY PLANNING

Students are advised to consult the university's preparedness site (http://www.preparedness.utoronto.ca) for information and regular updates regarding procedures relating to emergency planning.

ACCESSIBILITY NEEDS

The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact The UTSC Accessibility Services as soon as possible: http://www.utsc.utoronto.ca/~ability/

We also suggest you also refer to the following University of Toronto Scarborough Library link: http://utsc.library.utoronto.ca/services-persons-disabilities

PLAGIARISM

Normally, students will be required to submit their course work to Turnitin.com (via Quercus) for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

Any form of plagiarism will not be tolerated. University of Toronto Code of Behaviour on Academic Matters states that "it shall be an offense for a student knowingly: to represent as one's own any idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work, i.e., to commit plagiarism."

For accepted methods of standard documentation formats, including electronic citation of internet sources please see the UofT writing website at: http://www.writing.utoronto.ca/advice/using-sources/documentation

The full Code of Behaviour regulations could be found from consulting http://www.sgs.utoronto.ca/facultyandstaff/Pages/Academic-Integrity.aspx

WRITING AND ENGLISH LANGUAGE

As well as the faculty writing support, please see English Language and writing support at University of Toronto: http://www.sgs.utoronto.ca/currentstudents/Pages/English-Language-and-Writing-Support.aspx
Students have commented that they found the latter address extremely helpful for writing term papers.

The following are also useful:

Sylvan Barnett, *A Short Guide to Writing About Art*. 5-7th edition (New York: Harper-Collins, 1997)

William Strunk Jr., E.B. White. The Elements of Style (New York: MacMillan Publishing)