

"CONTAMINANTS HYDROGEOLOGY"
(EESD02 H3-S L01)

Instructor: Dr. Silvija Stefanovic

Lecture: Monday 10–1pm; HW214
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The Intent of the Course:

Natural hydrochemical processes; the use of major ions, minor ions, trace metals and environmental isotopes in studying the occurrence and nature of groundwater flow. Point and non-point sources of ground water contamination and the mechanisms of contaminant transport.

Prerequisite: At least 1 full credit in Environmental Science at the C-level.

Suggested Readings:

“Contaminant Hydrogeology”, C. W. Fetter, Thomas Boving, David Kremer, 2017, 3rd Edition, Waveland Press

Lecture Notes:

The lecture slides will be posted in *.pdf format on the Quercus. You will require Adobe Reader to open the files (available free of charge at www.adobe.com).

Course Email Policy:

Email is not an effective way of teaching and email inquiries regarding course materials will not be answered. Dr. Stefanovic will be available during designated in-person office hours to answer questions regarding course material. If you have questions, please see instructor during office hours – this time is for you so please do not hesitate to use it.

TA will also be available during the designated in-person office hours and will respond on the emails pertaining assignments.

Grading:

Assignments (3)	35% (10+15+10 %)
Seminar	15%
Seminar Attendance	3%
Final Examination:	47%

Assignments:

You will have three individual assignments during the term. You will be able to access the problem sheets on the Quercus at the times detailed below. More details on the assignments will be circulated during the term.

<i>Topic</i>	<i>On Quercus</i>	<i>Submission Due</i>
Assignment #1	Jan. 29 th	Feb.12 th
Assignment #2	Feb. 12 th	Mar. 4 th
Assignment #3	Mar. 4 th	Mar. 18 th

Seminar:

The seminars will start on Jan. 29th and will take place after the lecture. The seminar schedule is below:

	Group #	Topic	Week #	Date
1.	Group 1, 2	Contaminated groundwater flow	Week 4	January 29
2.	Group 3, 4	Capture Curve Analysis	Week 5	February 5
3.	Group 5, 6	Contaminant Transport in Aquifer I (Instantaneous one-dimensional transport of passive/reactive contaminants)	Week 6	February 12
4.	Group 7, 8	Contaminant Transport in Aquifer II (Continuous one/two/three-dimensional transport of passive/reactive contaminants)	Week 7	February 26
5.	Group 9, 10	Contaminant Partitioning in the Subsurface Environment	Week 8	March 4
6.	Group 11,12	Abiotic and Biotic Contaminant Transformations in Subsurface Waters	Week 9	March 11

Two teams of maximum 2 students will each be assigned a specific subsection of the studied major contaminant hydrogeology area. Each team will need to review ONE recent research paper (not older than 10 years) and to prepare a short power point presentation (15 min) of these reviews (findings). It is strongly advised to send the paper to the instructor for approval before proceeding with the seminar. Both groups will present the paper on the same topic so communication between groups and with instructor are required to avoid overlapping in the paper selection.

After the presentations, the groups should initiate discussion on the assigned topic and ask each other at least 4 questions in total (each student one question minimum). These questions should be related to the presented papers. Dr. Stefanovic will act as a moderator during these discussions, and she will mark your seminars and questions. Attendance of the seminars is worth 3% of the final grade (each week 0.5%). You will be responsible to sign attendance sheet twice, before and after the seminars. If you are late or leave early you will lose 0.25% of the mark. Please do not forget to sign it.

Missed Term Work Policy:

If you miss term work due to illness, emergency, or other mitigating circumstances you have to formally self-declare absences through DPES on-line self-declaration form (<https://www.uts.utoronto.ca/physsci/self-declaration-absence-form-0>). These on-line requests will be sent directly to your instructor, as well as to the department. The form is conveniently placed on the front page of DPES website, just underneath the picture with the “smiley faces” during the groundbreaking of our EV building (<https://www.uts.utoronto.ca/physsci/welcome-physical-environmental-sciences>). If you miss term work with a verifiable reason (i.e. you have a doctor’s note or have made provisions for a VERY good reason with the professor PRIOR to the mid-term), please submit the proof for your absence. If the reason is medical, an official UTSC medical note must be completed by a doctor who examined you while you were ill/injured. The medical note can be downloaded at http://www.uts.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf. Please note that you still have to submit your absence on-line requests through ACORN. Both submissions have to be done **within 3 business days** after the day/due date of the term work. The self-declarations submitted after this time will not be considered.

Late assignments and seminar will not be accepted and assigned a grade of zero. Extensions will be granted ONLY with medical note or under exceptional circumstances. Your TA/Dr. Stefanovic must be informed about that immediately and documentation has to be provided within 3 days after the due date of the assignment/seminar.

Final Exam:

The 2.5-hour final examination is worth 47% of the final grade for the course. It will be a combination of figure labelling, short answer questions and calculations.

The final exam will draw from the assignments, lectures and includes lecture notes and any material presented in the classroom. Information from the suggested readings, seminars and other resources not directly covered in class will not be tested on exams. More details about the exams will follow.

Accessibility Statement:

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. I will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations at (416) 287-7560 or ability@utsc.utoronto.ca.

Academic Integrity Statement:

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters

(<http://www.governingcouncil.utoronto.ca/Assets/Governing+Council+Digital+Assets/Policies/PDF/ppjun011995.pdf>) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

Potential offences include, but are not limited to:

In papers and assignments:

1. Using someone else's ideas or words without appropriate acknowledgement;
2. Submitting your own work in more than one course without the permission of the instructor;
3. Making up sources or facts;
4. Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

1. Using or possessing unauthorized aids;
2. Looking at someone else's answers during an exam or test;
3. Misrepresenting your identity; and
4. When you knew or ought to have known you were doing it.

In academic work:

1. Falsifying institutional documents or grades;
2. Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes; and
3. When you knew or ought to have known you were doing so.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If students have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, they are expected to seek out additional information on academic integrity from their instructors or from other institutional resources.

Recording of Classroom Material by Students:

Recording or photographing any aspect of a university course - lecture, tutorial, seminar, lab, studio, practice session, field trip etc. – without prior approval of all involved and with written approval from the instructor is not permitted.

Use of Generative Artificial Intelligence Tools:

The use of generative artificial intelligence tools or apps for any evaluations in this course, including tools like ChatGPT and other AI writing or coding assistants, is prohibited. This course policy is designed to promote your learning and intellectual development and to help you reach course learning outcomes

Lecture Topics:

1. Introduction, ground rules, expectations and course structure.

Introduction to Contaminant Hydrogeology;

Video: “The Nature of Earth: Introduction to Geology”, Lecture #23:” Groundwater”

Jan. 8th

2. Types and sources of the contamination; Groundwater Chemistry

Jan. 15th

3. Principles of Groundwater Flow

Jan. 22rd

4. Capture Curve Analysis

Assignment #1 – Tutorial

Jan. 29th

5. Contaminant Transport: Transport of passive and reactive contaminants;

One-dimensional soil column Advection-Dispersion Equation (ADE)

Feb. 5th

6. Contaminant Transport: Two-dimensional Advection-Dispersion Equation for instantaneous input;

One- and Three-dimensional Advection-Dispersion Equation for continuous input

Assignment #2 – Tutorial

Feb. 12th

FAMILY DAY (University closed)

Feb. 19th

7. Contaminant Partitioning in the Subsurface Environment

Feb. 26th

8. Problem Set (Tutorial)

Assignment #3 – Tutorial

Mar. 4th

9. Abiotic and Biotic Contaminant Transformations in Subsurface Waters

Mar. 11th

10. Isotope Hydrology and Applications in Hydrogeology

Mar. 18th

11. Climate Change Impacts on Groundwater Quality

Mar. 25th

12. Course Review; Final exam preparation

April 1st

I will follow this schedule as closely as possible, but things being what they are, some of these topics may "overflow" over into other time slots.