COURSE CALENDAR DESCRIPTION

This course introduces students to hydrogeology and contaminant hydrogeology through theory, and computer simulations. Topics include: hydrologic cycle, groundwater flow on a regional scale; aquifers, aquitards and aquicludes; contaminant transport via groundwater; pumping of confined and unconfined aquifers; groundwater flow modeling, environmental impacts and remediation technologies. Prerequisites: LE/CIVL 3110 3.00; LE/CIVL 2240 3.00

INSTRUCTOR(S)

<table>
<thead>
<tr>
<th>Name</th>
<th>Section / Format / Term</th>
<th>Contact Email</th>
<th>Contact Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krol, Magdalena</td>
<td>Sec. A / LECT / F</td>
<td><a href="mailto:magdalena.krol@lassonde.yorku.ca">magdalena.krol@lassonde.yorku.ca</a></td>
<td>York Ext. 31328</td>
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ADDITIONAL INFORMATION

TOPICS AND CONCEPTS

The objective of this course is to build on the student’s knowledge of hydrogeology and extend their knowledge of advanced topics in groundwater and contaminant transport. Topics included are:
1. Saturated groundwater flow
2. Flow to wells
3. Groundwater flow modeling
4. Contaminant transport
5. Simulation of contaminant transport
6. Remediation strategies
7. Environmental regulations

COURSE LEARNING OBJECTIVES

This course aims to:
1. Provide the students with basic concepts and fundamental principles of hydrogeology;
2. Make use of modern engineering education techniques and learning aids to assist students in their understanding of various topics in hydrogeology; and,
3. Provide sufficient knowledge using real-life examples and case histories to emphasize the importance of environmental protection.

COURSE LEARNING OUTCOMES

After completing this course, the students should be able to:
1. Understand the physical concepts behind groundwater flow
2. Understand key hydraulic parameters such as permeability, hydraulic conductivity and how they relate to the material and fluid parameters;
3. Understand concepts behind water flow to wells for confined and unconfined aquifers
4. Understand the key concepts of contaminant transport (diffusion, dispersion, sorption, decay);
5. Use analytical solutions to model groundwater flow and mass transport
6. Develop design solutions to solve hydrogeological problems
7. Determine legislation and engineering standards relevant to environmental engineering

**GRADED ASSESSMENT**

Assignments: 20%
Midterm: 15%
Term Project: 25%
Final Examination: 40%

**REQUIRED TEXT**


**SUGGESTED TEXT**

2. Fetter, C.W., Contaminated Hydrogeology, 2nd ed. 1998

**ONLINE RESOURCES**

Dedicated course website that will deliver on-line content, such as lecture videos, links to articles and other materials.


**ACADEMIC INTEGRITY LINKS**

- Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
- Academic Integrity - http://lassonde.yorku.ca/academic-integrity

**STUDENT LINKS**

- Student Rights and Responsibilities - http://oscr.students.uit.yorku.ca/student-conduct
- Religious Observance - https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs
- Counselling and Disability Services - http://cds.info.yorku.ca/
- York University’s Policies on Gender/LGBTQ*/Positive Space - http://rights.info.yorku.ca/lgbtq/

**LAND ACKNOWLEDGEMENT**

- We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.
- The Indigenous Framework for York University: A Guide to Action can be found here: http://indigenous.info.yorku.ca/
- Meaning of a land acknowledgement: http://healthydebate.ca/opinions/indigenous-land-acknowledgements

Many courses utilize Moodle, York University’s course website system. If your course is using Moodle, click here to access it.

Moodle @ York University