ENVE 5201/4002 Environmental Geotechnical Engineering  
Winter 2022

Instructor  
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office hours: Tue 13:00 – 14:00

Teaching Assistant  
Oday Al-Heetimi  
email: odayalheetimi@cmail.carleton.ca  
office: N/A  
office hours: by email

Course Dates:  
Lectures: January 10 – April 12  
Tuesday 14:30 – 17:25  
Southham Hall (SA) Room 416

Tutorials: January 10 – April 12  
Thursday 12:30 – 13:25  
Azrieli Theater  
Room 302

Final examination (tentative, to be confirmed)  
April 18, 2022 9:00 – 12:00  
Brightspace

A missed final examination will result in a grade of zero unless a medical excuse is provided to the Student Services. In such case, a deferred final examination may be arranged.

Course Description:  
This course focuses on landfill design as its main subject. Specific topics include:
  • Hydrogeologic principles including groundwater flow, water budget and contaminant transport.
  • Landfill design, including:
    o General principles.
    o Landfill liners, including clay leachate interaction, clay liners, geosynthetics and composite systems.
    o Landfill covers, including design principles based on unsaturated soil mechanics and environment-specific factors.
    o Leachate and gas collection systems.
  • Landfill operation, monitoring and quality control/quality assurance, including leak detection and control.
  • Case studies of geotechnical and geoenvironmental failures of landfills.

Grading  
Assignments & Tutorials: 25%  
Group Presentation and Report: 25%  
Final Examination: 50%
Required Text
2. Lecture notes (Softcopy on Brightspace. You must bring a hardcopy to lectures)
3. Reading materials posted on Brightspace.

Optional Textbooks:

Additional References

Assignment Submission
All assignments and other submissions should be completed through Brightspace. While you may submit your assignments after the due date, a grade penalty will be applied as follows: -20% if submitted prior to the solutions being posted; and a grade of zero if submitted after the solutions are posted.

Solutions
Assignment solutions will be posted on Brightspace seven days after the assignment due dates.

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation.
If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). Requests made within two weeks will be reviewed on a case-by-case basis. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/vmc) for the deadline to request accommodations for the formally-scheduled exam (if applicable).
<table>
<thead>
<tr>
<th>Lecture Date</th>
<th>Lecture Topic:</th>
<th>Tutorial (Thursdays):</th>
<th>Assignments due on the day of the class at 4pm:</th>
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<td>January 11</td>
<td>COURSE REVIEW AND OBJECTIVES INTRODUCTION LEGISLATION</td>
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<td>January 18</td>
<td>GEOTECHNICAL PROPERTIES OF WASTE</td>
<td>Tutorial #1: geotechnical properties of waste</td>
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<td>January 25</td>
<td>HYDROGEOLOGIC PRINCIPLES 1/3</td>
<td>Tutorial #2: 1D flow through porous media</td>
<td>Assignment 1: geotechnical properties of waste</td>
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<td>HYDROGEOLOGIC PRINCIPLES 2/3</td>
<td>Tutorial 3: 2D seepage modelling (PLAXIS LE)</td>
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<td>February 8</td>
<td>HYDROGEOLOGIC PRINCIPLES 3/3</td>
<td>Tutorial #4: contaminant transport</td>
<td>Assignment #3: 2D seepage modelling (PLAXIS LE)</td>
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<td>February 15</td>
<td>LANDFILL DESIGN</td>
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<td>February 22</td>
<td>WINTER BREAK</td>
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<td>March 1</td>
<td>LANDFILL LINERS</td>
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<td>LANDFILL COVERS</td>
<td>Tutorial #5: unsaturated flow</td>
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<td>LANDFILL OPERATION, MAINTENANCE AND MONITORING</td>
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<td>LANDFILL MECHANICAL STABILITY</td>
<td>Tutorial #6: 2D limit equilibrium stability of landfills</td>
<td>Assignment #6: landfill settlement and stability</td>
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<td>March 29</td>
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<td>April 12</td>
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