Instructor: Paul Simms, P. Eng
Room: ME 2372
Email: Paul_Simms@carleton.ca

Lectures

Wednesdays and Fridays Southam Hall  404 1:05 pm to 2:25 pm

Tutorial

TA: TBA
Fridays 4:05 pm -5:25 pm

Adopted Texts


Additional Reference Texts


Lecture Notes
Lecture notes for each class will be available the evening before each class on the course page in the Brightspace page
Marking Scheme - undergrad

Assignments / Quiz  20 %
Midterm  30 %
Final  50 %

Students must earn a passing grade on the final to receive a passing grade in the course.

Graduate students in ENVE 5301 will also be required to submit a project on a self-coded numerical simulation of contaminant transport. Their project will be worth 15% of their mark. Their assignments will count for 15%, their midterm will count for 25%, and their final will count for 45%.

Expected lecture schedule

<table>
<thead>
<tr>
<th>Week (Monday date)</th>
<th>Topic</th>
<th>Book Chapter (DS – Domenico and Schwartz, AW- Anderson and Woessner)</th>
<th>Coursework /Tutorial</th>
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<tr>
<td>Sept 5th</td>
<td>Introduction, review of Darcy’s law, hydraulic conductivity / permeability, REV, hydrostratigraphy, 1-D steady state flow calculations,</td>
<td>DS - 2.1, 3.1-3.4</td>
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<td>Sept 12th</td>
<td>Derivations of formal steady-state and transient flow equations. Review of flow nets Flow in confined and unconfined aquifers Pumping drawdown curves, field methods to determine hydraulic conductivity.</td>
<td>DS 4.1 - 4.4, 6.1-6.3</td>
<td>Assignment 1 Due Sept 24th (Friday 5 pm to TA)</td>
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<td>Sept 19th</td>
<td>Physical phenomena of mass transport (Advection, dispersion, particle) Analytical solutions</td>
<td>DS 10.1-10.5</td>
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<td>Sept 26th</td>
<td>Representation of chemical-</td>
<td>DS 13.1-13.2</td>
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<td>Date</td>
<td>Topic</td>
<td>Notes</td>
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| October 3rd  | Numerical modelling of groundwater flow: What is a model?  
Defining the conceptual model. Finite difference methods for solving the flow equations. Discretization. Boundary conditions Steady-state flow | AW 1-3                          |
| October 10th | Numerical modelling of groundwater flow: Sources, Sinks  
Transient flow | AW 4,5                         |
|               | Assignment 2: Due October 21st                                     | Friday 5 pm to TA                |
| October 17th | Modelling Mass transport – Two approaches to solve the advection-dispersion equation | AW 11,12                        |
| BREAK        | The MODFLOW software                                               | MIDTERM 90 minutes in Class (Nov 2nd) |
| October 31st | Site investigation techniques, Aspects of groundwater remediation   | DS 16.4-16.7                    |
| November 7th | Unsataturated flow theory and applications                          |                                 |
| November 14th| Multiphase flow and application to NAPL spill remediation           | Assignment 3: Analysis of a contaminant plume  
Due Wednesday November 30th by 5 pm electronic submission | DS 16.3                       |
| November 28th| Review                                                              |                                 |
| December 5th | Review                                                              |                                 |
Please note:

The Paul Menton Centre for Students with Disabilities (PMC) provides academic accommodations and support services to students with Learning Disabilities (LD), 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 permanent, persistent/prolonged, or temporary disability requiring academic accommodations in my course, please contact the PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation.

If you are already registered with the PMC, please request your accommodations for this course through the Ventus Student Portal 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. For final exams, the deadlines to request accommodations are published in the University’s Academic Calendars.

After requesting accommodations through the Ventus Student Portal, please meet with me to discuss your accommodation needs and how they will be implemented in my course.

Requests for Academic Accommodation for Religious Obligations
Students requesting academic accommodation on the basis of religious obligation should make a formal, written request to their instructors for alternate dates and/or means of satisfying academic requirements. Such requests should be made during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist, but no later than two weeks before the compulsory event. Accommodation is to be worked out directly and on an individual basis between the student and the instructor. Students who have questions or want to confirm accommodation eligibility of a religious event or practice may refer to the Equity Services website for a list of holy days and Carleton’s Academic Accommodation policies, or may contact an Equity Services Advisor in the Equity Services Department for assistance.

Requests for Academic Accommodation for Pregnancy:
Pregnant students requiring academic accommodations are encouraged to contact an Equity Advisor in Equity Services to complete a letter of accommodation. The student must then make an appointment to discuss her needs with the instructor at least two weeks prior to the first academic event in which it is anticipated the accommodation will be required.