PRINCIPLES OF GEOLOGICAL AND GEO-ENVIRONMENTAL ENGINEERING

CIVIL ENGINEERING 2J04
(WINTER 2020)

Instructor  Dr. James Leach
leachjm@mcmaster.ca
BSB-327, Ext. 20438
Office Hours: tbd

Teaching Assistants:  tbd

Schedule:

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Type</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>4:30pm - 5:20pm</td>
<td>Lecture</td>
<td>CNH/103</td>
</tr>
<tr>
<td>Wednesday</td>
<td>4:30pm - 5:20pm</td>
<td>Lecture</td>
<td>CNH/103</td>
</tr>
<tr>
<td>Thursday</td>
<td>4:30pm - 5:20pm</td>
<td>Lecture</td>
<td>CNH/103</td>
</tr>
<tr>
<td>Tuesday</td>
<td>9:30am – 11:20am</td>
<td>Tutorial 1</td>
<td>CNH/106</td>
</tr>
<tr>
<td>Wednesday</td>
<td>8:30am – 10:20am</td>
<td>Tutorial 2</td>
<td>KTH/B132</td>
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Lab schedule: see CCW next pages

Course Objectives:

Lectures and related discussion will cover the topics of ecosystem fundamentals, ecosystem and sustainability, soil-based ecosystems, minerals and rocks, soil classification, seismology and earthquakes, surface water fundamentals, sediment and nutrient control, water use and land management, solid waste management, air pollution and human health, groundwater flow and monitoring, contaminants transport in aquifers, site remediation, land use and ecosystem impacts, and development of increasingly sustainable communities.

Learning Outcomes:

Note: Numbers in parenthesis indicate learning indicators of attributes

Once students have completed CE-2J04, they should have a good understanding of:

- Principles of geological and geo-environmental engineering; (1.2)
- Environmental ecosystems and the processes which sustain them, (1.2)
- Basic interrelationships that exist between the environment, humans and other living species (9.1)
- Fundamentals of geology (mineral and rocks) and seismology/earthquake, (1.2)
- Surface water (hydrology), groundwater flow, monitoring wells and contaminants transport, (1.2)
- Solid waste management, hazardous waste management, and site remediation,
- Air pollution and global atmospheric change, and impact on human health.
• Actions which can be incorporated into the Engineering Profession and daily activities of individuals to solve geo-environmental problems and help curtail current and potential environmental impacts. (1.2; 9.1)

The design project will focus on the integration of a number of sustainability design principles. Student groups will be required to prepare and submit a professional final report. (9.1)

The Labs will be on Soil Classification using: Hydrometer Method and Atterberg Limits

CEAB Attributes
1. Knowledge
   1.2 Competence in Natural Sciences.

9. Impact
   9.1 Is able to identify and quantify the full range of short-term, long-term, local and global impacts of their engineering projects on society, including: economic aspects, social, cultural, and human health aspects, and; ecosystem integrity aspects.

Textbook: The following textbooks are suggested, but they are not mandatory. The Custom Courseware is mandatory for this course.


Custom Courseware from Bookstore

Course Evaluation: Assignments & Labs 10%
Design Project 15%
Midterm Exam 25%
Final Exam 50%
(Percentage to letter grade conversion scale is the same as that used by the Registrar’s Office)

COMMUNICATION, ATTENDANCE, AND SCHEDULE:
The main form of communication in this course will be the classroom. Therefore, course attendance is expected for lectures, tutorials, and labs. There is also an Avenue to Learn website, where course notes, and related information will be posted. Note that the schedule may change slightly throughout the term, and any changes will be announced in class and posted on the Avenue to Learn website. Students are strongly encouraged to take advantage of lecture, lab, and tutorial time to ask questions and seek clarification.

Students are NOT authorized to record lectures or lab information sessions using video, audio or image recording devices without documented approval from the course instructor.

As a courtesy and to ensure timely response to emails, you must include your name and student ID number in the email signature and course code in the email subject line. Emails to the instructor or TAs must
be sent from your McMaster University Account (not Avenue). Emails should be written in a professional manner, spell checked and proof read prior to sending them.

It is the student’s responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student’s designated primary e-mail account via their “@mcmaster.ca” alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student’s @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

MISSED LAB WORK:
Lab work missed due to illness or personal circumstances may be made up. You must submit appropriate documentation (e.g. note from physician) to your Faculty/Program office. It is your responsibility to follow-up with the lab supervisor. No mark will be entered for the missed work unless the Faculty/Program office gives its approval.

LABORATORY SAFETY
The Faculty of Engineering is committed to McMaster University’s Workplace and Environmental Health and Safety Policy which states: "Students are required by University policy to comply with all University health, safety and environmental programs". It is your responsibility to understand McMaster University Workplace and Environmental Health and Safety programs and policies. For information on these programs and policies please refer to McMaster University Environmental and Health Support Services Occupational Safety Risk Management Manual at: [http://www.workingatmcmaster.ca/rmm/index.php](http://www.workingatmcmaster.ca/rmm/index.php). It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment.

The safety requirements for JHE 220 & JHE 114 are listed below. Students not abiding by these safety requirements will be given one warning. Second offences will result in the student being asked to vacate the laboratory, and receiving a grade of zero for that particular lab.

- Glasses or safety glasses/goggles must be worn in the lab at all times
- Contact lenses are not to be worn in the lab.
- No short (i.e., above the knee) pants or skirts are permitted in the lab – lab coats must be worn over top of your clothing in these instances.
- Closed-toe shoes must be worn at all times.
- No loose clothing allowed.
- Long hair must be tied back.
- Gloves must be worn when working with hazardous chemicals (as indicated by the laboratory instructor).

ACADEMIC INTEGRITY
You are required to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.
Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at www.mcmaster.ca/academicintegrity.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism. e.g. the submission of work that is not own or for which other credit has been obtained
2. Improper collaboration in group work
3. Copying or using unauthorized aids in tests and examinations.

PROTECTION OF PRIVACY ACT (FIPPA)
The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and the posting of grades must be done in a manner that ensures confidentiality - see http://www.mcmaster.ca/univsec/fippa/fippa.cfm

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES POLICY
Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) https://sas.mcmaster.ca/ to make arrangements with a Program Coordinator. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University’s https://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDEGENOUS OR SPIRITUAL OBSERVANCES (RISO)
Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK – MSAF (ASSIGNMENTS, MID-TERMS, ETC)
The McMaster Student Absence Form is a self reporting tool for Undergraduate Students to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period.

You may submit a maximum of 1 Academic Work Missed requests per term. It is YOUR responsibility to follow up with your Instructor immediately regarding the nature of the accommodation.

If you are absent more than 5 days or exceed 1 request per term you MUST visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation.
This form should be filled out immediately when you are about to return to class after your absence. http://www.mcmaster.ca/msaf/

ANTI-DISCRIMINATION
The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible. https://www.mcmaster.ca/policy/General/HR/Discrimination_and_Harassment.pdf

EXTREME CIRCUMSTANCES
The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

AVENUE TO LEARN
In this course we will be using Avenue to Learn website. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.


Avenue to Learn will be available for the course and include a discussion board. This venue will be periodically but not continually checked by the course instructor or TA. Students are encouraged to discuss questions related to lecture notes and course material but CANNOT post lecture notes, data sets or solutions to lab or assignment related problems.

In case of discrepancy between the online and handout version of the course outline, the handout version shall be taken as correct.
# CE-2J04 Lecture Schedule

<table>
<thead>
<tr>
<th>Week of</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Thursday</th>
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<tbody>
<tr>
<td>Jan. 06</td>
<td>Introduction/Ecosystems</td>
<td>Ecosystems Structure</td>
<td>Ecosystems &amp; Sustainability</td>
</tr>
<tr>
<td>Jan. 13</td>
<td>Soil Ecosystem</td>
<td>Minerals</td>
<td>Minerals &amp; Rocks</td>
</tr>
<tr>
<td>Jan. 20</td>
<td>Igneous Rocks</td>
<td>Igneous Rocks</td>
<td>Sedimentary Rocks</td>
</tr>
<tr>
<td>Jan. 27</td>
<td>Metamorphic Rocks</td>
<td>Seismology/Earthquake</td>
<td>Seismology/Earthquake</td>
</tr>
<tr>
<td>Feb. 03</td>
<td>Soil Classification</td>
<td>Hydrology: Surface Water</td>
<td>Hydrology: Principles</td>
</tr>
<tr>
<td>Feb. 10</td>
<td>Engineering Hydrology</td>
<td>Evaporation Estimation</td>
<td>Infiltration Estimation</td>
</tr>
<tr>
<td>Feb. 17</td>
<td><strong>Reading Week / Midterm Recess</strong></td>
<td></td>
<td></td>
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<tr>
<td>Feb. 24</td>
<td>Water Pollution &amp; Prevention</td>
<td>Water Pollution &amp; Prevention</td>
<td><strong>Midterm Exam</strong> (Feb. 27 @ 4:30pm in class)</td>
</tr>
<tr>
<td>Mar. 02</td>
<td>Solid Waste &amp; Management</td>
<td>Air Pollution</td>
<td>Aquifers &amp; Groundwater</td>
</tr>
<tr>
<td>Mar. 09</td>
<td>Groundwater flow</td>
<td>Groundwater monitoring</td>
<td>Contaminant transport in aquifers</td>
</tr>
<tr>
<td>Mar. 16</td>
<td>Boreholes</td>
<td>Boreholes &amp; Wells</td>
<td>Site Remediation</td>
</tr>
<tr>
<td>Mar. 23</td>
<td>Site Remediation</td>
<td>Site Remediation</td>
<td>Geo-environmental impact assessment</td>
</tr>
<tr>
<td>Mar. 30</td>
<td>Geo-environmental impact assessment</td>
<td>Geo-environmental impact assessment</td>
<td>Revision</td>
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<tr>
<td>Apr. 06</td>
<td>Revision</td>
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</tbody>
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**Note:** Shading denotes geology and geo-environmental related material.

**Midterm Exam** is on **Thursday Feb. 27 at 4:30pm** in class (CNH/103).