PRINCIPLES OF GEOLOGICAL AND GEO-ENVIRONMENTAL ENGINEERING

CIVIL ENGINEERING 2J04
(WINTER 2018)

Instructor
Dr. Shawn Collins, P.Geo.,
collis2@mcmaster.ca
JHE-329A
Office Hours: Thursdays 10:20 – 11:30

Teaching Assistants:
Frezor Awol – awolf@mcmaster.ca
Sasha Han – hans6@mcmaster.ca
Pedram Darbandsari – darbandp@mcmaster.ca

Schedule:

Monday 9:30 - 10:20 Lecture KTH/B135
Tuesday 10:30 - 11:20 Lecture KTH/B135
Thursday 9:30 - 10:20 Lecture KTH/B135

Tuesday 14:30 – 16:20 Tutorial 2 BSB/136
Tuesday 16:30 – 18:20 Tutorial 1 BSB/120

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

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**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.

**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 Dishonesty:**
You are expected 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 [http://www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).
The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one’s 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.


**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

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<thead>
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<th>Week of</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Thursday</th>
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<tbody>
<tr>
<td>Jan. 02</td>
<td>-</td>
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<td>Introduction/Ecosystems</td>
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<td>Jan. 08</td>
<td>Ecosystems Structure</td>
<td>Ecosystems &amp; Sustainability</td>
<td>Soil Ecosystem</td>
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<td>Jan. 15</td>
<td>Minerals</td>
<td>Minerals &amp; Rocks</td>
<td>Igneous Rocks</td>
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<td>Jan. 22</td>
<td>Igneous Rocks</td>
<td>Sedimentary Rocks</td>
<td>Metamorphic Rocks</td>
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<td>Jan. 29</td>
<td>Seismology/Earthquake</td>
<td>Seismology/Earthquake</td>
<td>Soil Classification</td>
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<tr>
<td>Feb. 05</td>
<td>Hydrology: Surface Water</td>
<td>Hydrology: Principles</td>
<td>Engineering Hydrology</td>
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<td>Feb. 12</td>
<td>Evaporation Estimation</td>
<td>Infiltration Estimation</td>
<td>Water Pollution &amp; Prevention</td>
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<tr>
<th>Week of</th>
<th>Reading Week / Midterm Recess</th>
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<tbody>
<tr>
<td>Feb. 19</td>
<td>Midterm Exam (Feb. 27 @ 10:30 in class)</td>
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<tr>
<td>Feb. 26</td>
<td>Water Pollution &amp; Prevention</td>
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<td>Mar. 05</td>
<td>Air Pollution</td>
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<td>Mar. 12</td>
<td>Groundwater monitoring</td>
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<td>Mar. 19</td>
<td>Boreholes &amp; Wells</td>
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<td>Mar. 26</td>
<td>Site Remediation</td>
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<tr>
<td>Mar. 26</td>
<td>Site Remediation</td>
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<td>Apr. 02</td>
<td>Geo-environmental impact assessment</td>
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<td>Apr. 09</td>
<td>Revision (Classes End)</td>
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**Note:** Shading denotes geology and geo-environmental related material.

**Midterm Exam** is on Tuesday Feb. 27 at 10:30 in class (KTH/B135).