Department of Geography and Environmental Studies

GEOG 4108 PERMAFROST FALL TERM 2018

Instructor: Dr C.R. Burn; A330 Loeb Building
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Office Hours: Tuesday, Thursday 13:00 – 14:00 A330 LA (and by appointment)

Lectures: Wednesday, Friday 13:05 – 14:25 A211 LA

Textbooks:

The first is recommended.

Objectives:
To provide knowledge of the distribution, thermal characteristics, and properties of permafrost in Canada. To provide an understanding of the properties and behaviour of terrain underlain by permafrost. To discuss the origin of geomorphological features associated with permafrost aggradation and degradation. To examine hazards associated with the presence of permafrost that affect human activities. To consider the consequences of climate change for permafrost environments.

Programme: Lectures as per schedule; Reading as assigned or suggested; Exercises; Seminar presentations of literature appraisals; Term paper; Final examination

Evaluation: Exercises 20
Mid-term tests 20
Seminar Presentation 5
Term paper 15
Examination 40
100

Cell phones and social media: Students must turn off their cell phones before each class. Interruption of classes by users of cell phones is disruptive and distracting for instructors and students alike. Consultation of social media during classes is similarly inappropriate.
Assignments

1) Four sets of exercises will be distributed during the term. The exercises are due at the beginning of class, the week after distribution. **If an assignment is not handed in on time it will not be accepted. The marks for the missed pieces of term work (including exercises, mid-terms, seminar, and term paper) will be loaded onto the final examination.**

While you may collaborate with others in working through the assignments, you must prepare and submit your own separate report, written in your own words, which clearly demonstrates your understanding, interpretation and analysis of the assignment. Plagiarism is a serious academic offence and may lead to an F grade for the course or even expulsion from the University. If plagiarism is detected, the documents will be forwarded to the Dean’s office, and the student will be contacted directly by the authorities, not the instructor.

2) Mid-term tests will be held on October 5th and November 16th in the class periods. The tests will last one hour. You may leave the classroom if you consider that you have completed the test. If you leave early, you will necessarily disrupt other students. If you score 100%, your grade will stand. If you do not, your grade will be 0%. This practice ensures minimal disruption for other students and encourages you check and improve your answers.

3) Students are required to present a seminar paper towards the end of the course. Students must notify the instructor of their choice of topic by noon on October 5th. Failure to notify the instructor by this time will lead to a reduction in the final mark by 10%. Notification is by email. The paper will be presented in class during the 10th week, and a written version handed in. The written version must be no longer than 2,500 words, including title and abstract, but excluding references, tables and illustrations. The paper should follow the style of the Canadian Journal of Earth Sciences (see issue #1, 2000). Overlength papers will be penalized one mark (out of 15) for every 25 words over the 2,500 limit. The paper should be submitted in hard copy. The written paper is due by 11:35 on November 28th. Papers will be penalized up to 50% for incorrect spelling and grammar, and awkward syntax. Illegible papers will be failed. You must consult the instructor before 4 pm on September 30th regarding your intended choice of topic to obtain suggestions for your reading list. Failure to consult by this date will lead to a reduction in the final mark by 10%. [Consultation means a face-to-face meeting, not an email notification.]

4) A 3-hour examination will be held in the final examination period. The exam will comprise questions on textbook, lecture, and supplementary reading material. The date and time of the examination are set by examination services, not the instructor.

5) Supplementary readings will be assigned for each topic. These are taken from journals and other literature that is in the library, especially the Proceedings of the International Conferences on Permafrost. The essential supplementary reading for each week will be
placed on reserve, unless it is available on the internet through the library’s e-journals. Questions concerning the supplementary reading will appear on the final examination.

Plagiarism
The University Senate defines plagiarism as “presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.” This can include:

- reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source;
- submitting a take-home examination, essay, laboratory report or other assignment written, in whole or in part, by someone else;
- using ideas or direct, verbatim quotations, or paraphrased material, concepts, or ideas without appropriate acknowledgment in any academic assignment;
- using another’s data or research findings;
- failing to acknowledge sources through the use of proper citations when using another’s works and/or failing to use quotation marks;
- handing in "substantially the same piece of work for academic credit more than once without prior written permission of the course instructor in which the submission occurs."

Plagiarism is a serious offence which cannot be resolved directly with the course’s instructor. The Associate Dean of the Faculty conducts a rigorous investigation, including an interview with the student, when an instructor suspects a piece of work has been plagiarized. Penalties are not trivial. They can include a final grade of "F" for the course.

Academic Accommodation
You may need special arrangements to meet your academic obligations during the term because of disability, pregnancy or religious obligations. Please review the course outline promptly and forward any requests for academic accommodation to the Instructor during the first two weeks of class, or as soon as possible after the need for accommodation arises.

Students with disabilities requiring academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs. Documented disabilities could include but are not limited to mobility/physical impairments, specific Learning Disabilities (LD), psychiatric/psychological disabilities, sensory disabilities, Attention Deficit Hyperactivity Disorder (ADHD), and chronic medical conditions. Registered PMC students are required to contact the PMC, 613-520-6608, every term to ensure that your Instructor receives your Letter of Accommodation, no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you only require accommodation for your formally scheduled exam in this course, you must submit your request for accommodations to PMC by Nov. 9th, 2018.

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at [http://carleton.ca/equity/accommodation](http://carleton.ca/equity/accommodation).
Uploading of course materials
Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copy protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials, are also protected by copyright and remain the intellectual property of their respective author(s). All course notes taken by a student are the intellectual property of the student.

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials presented to them publicly for commercial or non-commercial purposes without express written consent from the copyright holder(s).

The instructor uses the white board for notes and diagrams. Power Point slides are used for illustrations only. No classroom materials will be electronically distributed to students. All assignments and instructions for assignments will be distributed in hard copy.

Class schedule
Week 1  S05  Introduction; Definitions; distribution of permafrost.
         S07  Climatic controls on permafrost in Canada.
Week 2  S12  Microclimatic controls on ground temperatures; surface energy balance.
         S14  Thickness of permafrost; thermal properties.
Week 3  S19  Thermal regime of near-surface permafrost; thermal offset.
         S21  The active layer; zero-curtain.
Week 4  S26  Growth of permafrost; Stefan solution.
         S28  Development of pingos.
Week 5  O03  Seasonal frost mounds.
         O05  First mid-term test.
Week 6  O10  Soil freezing. Unfrozen water content characteristic.
         O12  Ice segregation. Clausius-Clapeyron equation.
Week 7  O17  Frost heave
         O19  The ice-rich zone at the surface of permafrost
Week 8  O24  Fall term break
         O26  Fall term break
Week 9  O31  Thermal contraction and ice-wedge development.
         N02  Ice-wedge polygons.
Week 10 N07  Student presentations.
         N09  Student presentations
Week 11 N14  Cryoturbation.
         N16  Second mid-term test.
Week 12 N21  Soil carbon and permafrost.
         N23  Massive ice in Canada.
Week 13 N28  Thermokarst processes.
         N30  Talik geometry.
Week 14 D05  Construction in permafrost terrain.
         D07  No class (Monday schedule)
The course will adhere to this schedule as much as possible. The dates for the mid-term tests and student presentations are fixed.

**Important dates:** September 05 is the first class; September 19 is the last day for registration in classes. October 22-26 is the Fall Break. No classes. December 07 is the last class. December 10 is the last day to withdraw from the course. The date of the final examination will be known on October xx.

**Exercise due dates**
Sept. 14; Sept. 28; Oct. 12; Nov. 09.

**Seminar paper dates**
September 28 4 pm deadline for consultation with instructor (10% penalty on this assignment for non-compliance)
October 05 12:00 deadline to declare topic for the paper (10% penalty on this assignment for non-compliance).
October 19 4 pm deadline for discussion of draft outline of presentation with instructor
November 02 4 pm deadline for discussion of draft presentation with instructor
November 07 and 09 presentations in class
November 28 11:35 deadline for written papers.
Principal sources

Textbooks

Journals

Canadian Journal of Earth Sciences
Canadian Geotechnical Journal
Permafrost and Periglacial Processes
Arctic, Antarctic, and Alpine Research
Arctic
Journal of Geophysical Research
Geophysical Research Letters
The Cryosphere

Conference Proceedings

International Conferences on Permafrost (available on-line at http://ipa.arcticportal.org/)
First, 1963, Lafayette, Indiana.
Second, 1973, Yakutsk, USSR.
Third, 1978, Edmonton, Canada.
Fourth, 1983, Fairbanks, USA.
Fifth, 1988, Trondheim, Norway.
Sixth, 1993, Beijing, China.
Seventh, 1998, Yellowknife, Canada.
Eighth, 2003, Zurich, Switzerland.
Ninth, 2008, Fairbanks, USA.
Tenth, 2012, Salekhard, Russia.

Canadian Permafrost Conferences: (upto 6th available on-line at http://www.aina.ucalgary.ca/cpc/)
Fourth, 1980, Edmonton, AB.
Fifth, 1990, Ste. Foy, QC.
Sixth, 2010, Calgary AB.
Seventh, 2015, Québec City, QC.

Maps