GEOG 5303 Geocryology: Syllabus, Winter Term 2020 (DRAFT)

Instructor: **Stephan Gruber**
Office: Room B443A Loeb Building
Hours: By appointment.
Email: stephan.gruber@carleton.ca
Phone: (613) 520-2600 extension 2562

Prerequisites: GEOG 4108 (Permafrost) or permission of the Department

Meeting times: Mondays, 11:35–14:25

First meeting: January 6, 2020
Last meeting: April 6, 2020

Meeting location: Loeb A211.

cuLearn: This course in on cuLearn as **GEOG5303A Winter 2020**. To access your courses on cuLearn go to http://carleton.ca/culearn. For support, go to http://carleton.ca/students. Any unresolved questions can be directed to Computing and Communication Services (CCS) by phone at 613-520-3700 or via email at ccs_service_desk@carleton.ca.

Content and philosophy

This course is intended to provide a solid understanding of processes relevant for studying and quantifying phenomena related to permafrost and seasonally frozen soil. It also introduces methods and tools employed for this. As a graduate course, it will allow some freedom to choose a focus topic in line with your thesis or other special interests you may have.

The course has six main themes:

i. **Physical properties of water and how they influence cold-regions phenomena**
ii. **Ground thermal regime**
iii. **Permafrost-climate interaction**
iv. **Permafrost as a geologic/geotechnical material**
v. **Landforms**
vi. **Permafrost thaw in response to climate change and/or disturbance**

The character of the course is given by three basic elements: (A) Reading assignment complemented by lectures and demonstrations, (B) exercises to become familiar and competent with the application of key methods, and (C) project work presented in seminar style, intended to focus on your thesis topic or some other area of your interest. Especially (A) and (B) are complimentary in order to prepare you for solving relevant practical and scientific problems.

Data analysis and simulation experiments are important for fully understanding the ground thermal regime and its controls. This course will provide you with several tools and give guidance as to their use and their customization to a given problem. There will be no ready-made, cookbook-like like solutions, that you can follow step-by-step. Rather, you will be presented with a problem and a collection of methods and tools that you will need to apply towards finding a good solution. Previous experience with programming in any language is a great benefit. If you do not have experience in using e.g., R, IDL, Python, Julia or Matlab for data analysis, it will help you to partner with a student who does.

Learning outcomes

The following learning outcomes summarize the overarching expectations of student's abilities at the end of this course.

To pass this course, you must demonstrate the ability to:

(a) **apply** key concepts, theories, and methods in Geocryology to a given problem; connect these theories and methods with basic science;

(b) critically **discuss** the limitations of your work or that of others;

(c) **create**, **apply** and **evaluate** computer-aided tools to solve typical problems;

(d) **communicate** in a concise, accurate, traceable, and effective manner; and

(e) **discuss current topics** in Geocryology.

This implies a good understanding of: (i) the physical properties of water and how they give rise to the phenomena studied in Geocryology and Glaciology, (ii) the ground thermal regime and its changes over time, (iii) the processes and phenomena affecting the interaction of climate and subsurface, (iv) permafrost as a geologic or geotechnical material, (v) landforms that are typically found in permafrost landscapes and how they are caused by the physical properties of water, and (vi) permafrost thaw and how it is driven by climate change and disturbance.

Materials

Reading: Consider buying or borrowing this book: **Williams, P.J. and Smith, M.W. (1989) The Frozen Earth: Fundamentals of Geocryology, Cambridge University Press.** We will use it a lot in the course and it is good to have. Much of the other reading (scientific publications) will be made available in cuLearn or you will have to find them based on your own research.

Online resources: This course has an online component on cuLearn. Make sure you develop a sound strategy for organising your reading, your notes, and your learning. This can be paper based or by using a tool such as Mendeley (www.mendeley.com). If you need help, please contact the Student Academic Success Centre http://carleton.ca/sasc/.

Computers: We will perform several exercises requiring a computer. Students should have a laptop at their disposal for this or inform Stephan Gruber if this is a problem. Please make sure that you have a working wireless connection inside Carleton University and that you have R (https://www.r-project.org) and Python (https://www.python.org) installed on your computer.

Evaluation of students

Final grade: All evaluated work is graded on a scale of 0–100 points.

The final grade is determined by weighting:

Final exam	25%
Three assignments	75%
Total	**100%**

The course instructor – subject to the approval of the Faculty Dean – determines standing. This means that grades submitted by the instructor may be subject to revision. No grades are final until they have been approved by the Dean.

Final exam: The final exam will take place in the final exam period April 13–25, 2020 and the precise date will be announced during the term. It will consist of one or more essay questions and have a maximum duration of three hours. **Missing the final exam:** You must contact the Registrar's Office (not the instructor) within 5 working days.

Assignments: There will be **three written assignments** to be handed in. These will have various proportions of scientific writing and of calculation exercises that may require preparation of suitable figures from the data you analyse and work with. Please feel free to collaborate with others during the sessions to obtain common data and discuss open issues, but please submit your own individually written assignments, containing your own analyses, computer code and answers. Assignments must be supplied electronically (PDF, code) via cuLearn.

Missing assignments: If you miss a submission due to serious illness or a death in the family, you must obtain documentation to support your case. Examples of reasons that will NOT be considered for an alternative assignment/grading include, for example, being stressed or having too many duties in the same week. Lack of proper documentation will warrant a mark of 0 on that assignment. If you do provide documentation, an alternative to the assignment will be provided. Once you realize you'll be missing a submission, you need to contact Stephan Gruber. Please indicate whether you are a student registered with the PMC.

Penalty for late submission: Lab assignments have to be submitted before the due date/time indicated. Late submission results a score reduced by 20 points per started 24 hours of delay.

Technical problems: It is your responsibility to submit assignments on time. For instance, if your Internet connection may be unstable, make sure that you have either an alternative plan or enough reserve time. If you cannot submit your material because of a technical problem caused by the instructor or Carleton University, please make a printout of the screen documenting that problem and note the date/time to avoid a late penalty.

Appealing your grade: There may be a number of circumstances in which students will have questions regarding their grades. These questions may be about understanding the grading scheme; about the grade awarded for a specific piece of work, including work that has not been returned; or, about the determination of the final grade. Wherever possible, both during the term and after, concerns about the grading of student work should be settled informally between the student and the instructor. When appealing your grade, please familiarize yourself with sections 2.7 and 2.8 of http://calendar.carleton.ca/undergrad/regulations/ before beginning and appeal process. To make sure your case can be considered fairly, both for you and your fellow students, please provide the instructor with a short (one page maximum) summary of what point(s) you would like to have revisited and why you believe you deserve more points than you have received. Based on this, a personal meeting will be scheduled aimed at finding a resolution in agreement.

Evaluation of instructors and course

This course will be **officially evaluated** with a paper-based form near the end of the term. This evaluation is important (a) for the instructor to improve the course, and (b) provides a feedback to Carleton University for helping to assess the quality of teaching delivered by the instructor.

Please take the time to complete this evaluation as accurately and as constructively as you can. By doing so, you help us improve how we teach you and future students.

General feedback

If you have any pressing issue requiring an improvement in the course, especially with respect to **accessibility**, please contact us any time. If you notice spelling mistakes or things that can be improved in any of the materials we use, please let me know so I can fix it and make the course better for next year.

Academic regulations

The following section reviews the most important academic regulations at Carleton University. Please refer to the official version of the Academic Regulations of the University at http://calendar.carleton.ca/undergrad/regulations/ if you require further information. The official document takes precedence over this syllabus.

Copyright

Instructional Offences

The University Senate defines plagiarism as "*presenting, whether intentional 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 (**this includes computer code**);
- 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 Deans of the Faculty conduct 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 range from a mark of zero for the plagiarized work to a final grade of "F" for the course, and even suspension from all studies or expulsion from the University. For more information, see the web page on Academic Integrity at http://carleton.ca/studentaffairs/academic-integrity/.

Academic Accommodations

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

Pregnancy obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see the Student Guide.

Religious obligation: write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see the Student Guide.

Academic Accommodations for Students with Disabilities: 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). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable**).**