# Geography 3315/ Geology 3130
# Glacial Systems
Winter Term, 2023

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**Lectures**: Tuesdays and Thursdays at 2:30 -4:00 in RC 2003

**Course Description:**

This course is an introduction to the topics of glaciology and glacial geomorphology. The understanding of the topic helps in our understanding of the geomorphology of approximately 30% of land surface that is, or has been affected by glaciation recently. It also helps us understand the relationships between ice and global, and local, hydrology. The impact of global climate change will be most visible in the changes observed in glacial landscapes but the impact of those changes will be felt across the globe – especially in coastal communities.

In this course, we will study the nature and behaviour of glacial ice – the physics of ice formation (ex. mass balance) and movement. We will learn how glacial ice impacts the landscapes and to what extent. We will consider glacial landforms – depositional and erosional, and will learn how they are formed and under what conditions. Differences between alpine and continental glaciation – the process and the landforms – will also be highlighted.

We will also learn about the glacial history of the planet. Special emphasis will be placed on the glacial history of Canada and Northwestern Ontario.

**Course Objectives:**

Students will be expected to show thorough understanding of the following glacial systems concepts:

- Glaciers and Glacier Dynamics
- Distribution of Glaciers (modern and historical)
- Glacial Erosion
  - Processes
  - Landscapes and Landforms
- Glacial Deposition
  - Processes
  - Landscapes and Landforms
- Glaciofluvial processes
  - Erosion
  - Deposition
  - Landforms

Time permitting:

Glacial history of Northwestern Ontario

**Textbook (optional readings):**

Glaciers & Glaciation, 2nd Edition
Benn, D.I. and Evans, D.J.A., 2010, Hodder Education, 802 p.
Paterson Books - 3rd FloorGB 2403.2 B44 1998

Glaciers and landscape: a geomorphological approach.
David E. Sugden, Brian S. John.
Paterson Books - 3rd FloorGB 2403.2 S9 1976

**Assignment topics:**

1. Snowpack survey.

This assignment will involve active monitoring – data collection in the field – of the snow conditions during the winter term. Once a month at a selected site, you will collect snow attributes such as snow depth and temperature. You will also collect a sample in order to establish snow density at various snow pack depths.

2. Till Macro-fabrics

In this assignment you will learn how to plot sedimentary fabric data in order to interpret till's glacial history. The data collection process will be explained in class but the dataset used will come from an existing source – no field work is required.

3. Glacio-Isostasy

This is a map-based exercise involving isostatic rebound, eustatic sea level change and their inter-relationships. Dataset used will introduce you to the various ways of interpreting glacio-isostatic information – including establishing past rates of rebound, latent rebound potential and coastline modification resultant from the interactions between the sea level and continental plate rise.

**Course Grading:**

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|---|---|---|
| Progress Exam | 25 % | (Feb. 16) |
| Midterm Exam | 35 % | (Mar. 21) |
| Final Exam | 40 % | |
| Assignments | up to 15% | (optional*) |

*There are 3 optional assignments in this course. Each one is worth 5% and can be used to reduce the weight of either Progress or Midterm exam. For example, a student could choose to reduce the weight of Progress exam by 5% and the Midterm exam by 10% if they completed all 3 assignments. Each lab will have a strict deadline and must be completed before that time. No exceptions will be made.

**Course Policies**

The following course policies are consistent with those of the Geography Department and Lakehead University.

1. Regular attendance is expected in all zoom/lecture sessions.

2. Any absence due to illness, disability, or domestic affliction should be reported to the instructor. Additional digital materials will be available on the D2L site.

3. Students with special needs should talk to me at the beginning of the course and register with the Student Success Centre.

4. Assigned readings, when provided, are to be read prior to the next session. This will allow you to get the most out of the Zoom sessions and ask informed questions.

5. Questions may be asked anytime during lectures. The best way is to ask a question through the Zoom chat. You can also digitally raise your hand in Zoom. Failing those, if you feel it's important enough, just interrupt me!

6. Make-up exams will be given only with an acceptable excuse as defined by the University calendar (medical, bereavement, etc.)

7. Both of the tests and the final exam will be done through the D2L portal but will be done in person (in the assigned classroom). Please notify me if you are unable to obtain the use of a wifi-enabled laptop computer for the test.