Geography 4333
Advanced Glacial Geomorphology
Fall Term, 2012

Instructor: Dr. Kamil Zaniewski
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Lectures: Wednesdays and Fridays, 10:00 - 11:30 in RC-1002

Course Description:

This course will focus on the processes and landforms associated with modern and past glacial environments. An overview of the basics of glacial geomorphology will be followed with a much more detailed study of glacial dynamics, processes of erosion, transportation and deposition, as well as glaciotectonism. Glacial environment continuum, with the associated subglacial, ice-marginal and proglacial, sediments and landforms will also be considered. A number of lab exercises will be assigned.

Course Objectives:

The students will be familiar with all the major issues and terminology associated with glacial geomorphology. This includes the following topics:

Glaciers and Climate
Isostatic Rebound
Glacial Ice and Ice-flow Dynamics
Processes o f Erosion
Processes of Transportation
Glacial Hydrology
Glaciolacustrine Environments
Modern Valley Glaciers - Sediments and Hydrology
Glacial Stratigraphy
Paleosols (time permitting)
Glacioaeolian Environments (time permitting)

Textbook:

None.

Assigned Readings:

Chapters from:

Menzies, J. (Ed.) 1995. Modern Glacial Environments. Processes Dynamics and Sediments. (Library Call #: GB 2403.2 M632 1995)(on reserve)

Menzies, J. (Ed.) 1996. Past Glacial Environments. Sediments, Forms and Techniques. (Library Call #: QE 697 P38 1996)(on reserve)

Discussion Papers:

Anderson, L.W. (1978). Cirque glacier erosion rates and characteristics of neoglacial tills, Pangnirtung Fiord area, Baffin Island, N.W.T., Canada. Arctic and Alpine Research, 10: 749-760.

Andrews, J.T. (1971). Englacial debris in glaciers. Journal of Glaciology, 10: 410.

Boulton, G.S. (1970). On the origin and transport of englacial debris in Svalbard Glaciers. Journal of Glaciology, 9: 213-229.

Boulton, G.S. (1970). Englacial debris in glaciers: Reply to the comments of Dr. J.T. Andrews. Journal of Glaciology, 10: 410.

Briner, J.P., Overeem, I, Miller, G. and Finkel, R. (2007) The deglaciation of Clyde Inlet, northeastern Baffin Island, Arctic Canada. Journal of Quaternary Science, 22: 223-232.

Clarke, G.K.C., Leverington, D.W., Teller, J.T., Dyke, A.S. and Marshall, S.J. (2005). Fresh arguments against the Shaw megaflood hypothesis. A reply to comments by David Sharpe on "Paleohydraulics of the last outburst flood from glacial Lake Agassiz and the 8200 BP cold event". Quaternary Science Reviews, 24: 1533-1541

Hattestrand, S.G., Naslund, J.-O., Fabel, D. and Stroeven, A.P. (2004). Drumlin formation time: Evidence from Northern and Central Sweden. Geografiska Annaler, 86A: 155-167.

Kerr, M. and Eyles, N. (2007). Origin of drumlins on the floor of Lake Ontario and in upper New York State. Sedimentary Geology, 193: 7-20.

Lewis, T., Francus, P. and Bradley, R.S. (2007). Limnology, sedimentology, and hydrology of a jökulhlaup into a meromictic High Arctic lake. Canadian Journal of Earth Science, 44: 791-806

Lliboutry, L. (1987). Sliding of cold ice sheets. In: The Physical Basis of Ice Sheet Modelling. pp. 131-143. **(Available in the Map Library)**

Menzies, J., Zaniewski, K. and Dreger, D. (1997). Evidence, from microstructures, of deformable bed conditions within drumlins, Chimney Bluffs, New York State. Sedimentary Geology, 111: 161-175

Shaw, J. and Kvill, D. (1984). A glaciofluvial origin for drumlins of the Livingstone Lake area, Saskatchewan. Canadian Journal of Earth Science, 21: 1442-1459.

Shaw, J. and Sharpe, D.R. (1987). Drumlin formation by subglacial meltwater erosion. Canadian Journal of Earth Science, 24: 2316-2322.

van der Meer, J.J.M., Menzies, J. and Rose, J. (2003). Subglacial till: the deforming glacier bed. Quaternary Science Reviews, 22: 1659 – 1685.

Vincent, W.F., Gibson, J.A.E., Pienitz, R. and Villeneuve, V. (2000). Ice Shelf Microbial Ecosystems in the High Arctic and Implications for Life on Snowball Earth. Naturwissenschaften, 87: 137-141.

Weertman, J. (1957). On the sliding of glaciers. Journal of Glaciology, 3: 33-38.

Assignments:

Glacial landscapes (Peterborough and Rosyth)
Isostatic rebound
Till macro-fabrics

Course Grading:

Lab Assignments	20%	
Discussion Participation	10%	
Midterm Exam*	30%	(Oct. 26)
Final Exam*	40%	

*To pass the course, a student will be required to have at least 35 of the 70 marks allocated to both tests.

Course Policies

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

1. Regular attendance is expected in lectures.

2. Any absence due to illness, disability, or domestic affliction should be reported to the instructor. Absence due to extracurricular activities (e.g. athletics) should be discussed with the instructor **PRIOR** to the absence. If you miss a class, it is your responsibility to obtain the notes from a classmate. I can provide you with any handouts, but will not provide you a repeat of the lecture or my lecture notes.

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

4. Tardiness is frowned upon. Be late at your own risk.

5. Assigned readings, when provided, are to be read prior to the next lecture. This will allow you to get the most out of the lectures and ask informed questions.

6. Questions may be asked **anytime** during lectures. I won't be offended.

7. No make-up exams will be given without a medical excuse backed by a medical certificate. No one will be allowed to write the tests or the final exam prior to the scheduled date.

8. Lab assignments and essays are to be handed in before the specified due date. Material submitted after the deadline will be accepted but will be penalized 10% per day.

9. Lab assignments and essays will be graded for content, legibility, structure, spelling and grammar.