Autumn 2010. Course instructor: Ms. Lisa Tutty, BSc (hon) MSc PhD candidate in Geology

Office hours: Monday 10:30-11:30 *and* Wed 12:30 - 1:30 in Portable 103 - room #116.

Contact information: please use the *discussion board* on Blackboard (BB) for all course related communication. You may discuss matters of a *personal* nature (e.g. illness) during the office hours or by email (tutty@utsc.utoronto.ca). I like being able to discuss course related questions/concerns with students on BB because it is interactive (we can have a back and forth discussion) and because your fellow students may have been wondering about the same things but were afraid to ask. I am here to help you do well in this class; please don't be shy about asking me questions.

Course website: http://portal.utoronto.ca (Blackboard). **Lectures:** held Wed 2-5pm in SW221

Rationale: Why do we need to know about glaciers and their deposits? Because ice sheets have covered the country many times in the past 2 million years and Canada's landscapes and surface sediments in the main, have been profoundly modified by ice sheets. Engineering, mineral exploration, environmental, soils, hydrogeological work all require a firm knowledge of glacial geology. Oil exploration and development of Canada's north has to deal with permanently frozen ground (permafrost). Examining this glacial sediment cover also provides key information on past climate changes and environments.

Overview: Glaciations have occurred several times in Earth history at about 2.4 Ga (Huronian glaciation), between 750 and 545 Ma (Neoproterozoic glaciations), at 440 Ma (Late Ordovician glaciation), between 350 and 250 Ma (Late Paleozoic glaciations) and most recently within the last 2.5 million years when large continental ice sheets as much as 3 km thick, formed over North America and Europe (late Cenozoic glaciations). The landscape of Ontario is a fossil landscape inherited from the last ice sheet (Laurentide Ice Sheet) that began to grow about 70,000 years ago and disappeared only 10,000 before present; across Canada huge glacially dammed lakes formed and large areas are covered by glacial sediment; the Great Lake basins are the direct result of glacial erosion. Huge changes have taken place in flora and fauna as a consequence of glaciation; humans migrated into southern Ontario just as the ice sheet was leaving about 12,000 years ago.

Marks breakdown:

Midterm **test Oc 27 - 15%**

Field trip & individual field trip report **- trip Oct 20**, report due Nov 10 before 2:10pm - **15%**

Participation (*in-class* activities during each lecture/trip) **- 10%**

Poster assignment (group **or** individual) - due Nov 24 before 2:10pm **- 25%**

Final exam **- 35%**

Date	Topic	Readings [Lecture schedule is subject to change]
15 Sep	Lec1: Glacial morphology & movement	1.Ch 1 (pages 4-30 only) **(Benn & Evans)** 2.Glacial Landforms: Introduction **(Ency Quat Sci)** 3.Glacial Land Systems **(Ency Quat Sci)** 4.Ice Sheet Growth & Decay **(Ency Quat Sci)** 5.Evidence of Glacier and Ice Sheet Extent **(Ency Quat Sci)** 6. Evidence of Glacier Recession **(Ency Quat Sci)**
22 Sep	Lec2: Englacial & Supraglacial	1. Sections 3.3 and 11.4 and 12.3 **(Benn & Evans)** 2. Ch 6 Supraglacial and Englacial Environments **(Benn & Evans)** 3. Moraine Forms & Genesis **(Ency Quat Sci)** 4. Glacigenic lithofacies. **(Ency Quat Sci)**
29 Sep	Lec3: Subglacial	1. Ch 5 Subglacial Processes **(Benn & Evans)** 2. Sections 3.4, 11.2 and 12.4 **(Benn & Evans)** 3. Erosional Features: Major Scale Forms **(Ency Quat Sci)** 4. Erosional Features: Micro to Macro Scale Forms **(Ency Quat Sci)** 5. Tills **(Ency Quat Sci)**
6 Oc	Lec4: Glaciomarine & Glaciolacustrine	1. Glacigenic Lithofacies **(Ency Quat Sci)** 2. Glaciomarine Sediments and Ice Rafted Debris **(Ency Quat Sci)** 3. Sections 10.6, 11.6 and 12.5 **(Benn & Evans)** 4. Ch 8 Glacilacustrine and Glacimarine Environments **(Benn & Evans)**
13 Oc	Lec5: Glaciolacustrine(con't) & Glacifluvial	1. Glacifluvial Landforms of Deposition **(Ency Quat Sci)** 2. Glacifluvial Landforms of Erosion **(Ency Quat Sci)** 3. Sections 3.9 and 10.4 **(Benn & Evans)**
20 Oc	**Field Trip**	Bus trip, 7am until late evening, fee.
27 Oc	**MIDTERM TEST**	Covers lectures 1-5. Multiple choice and short answer questions.
3 Nov	Lec6: Periglacial/Permafrost	1. Ch 7 Terrestrial Ice-Marginal Environments **(Benn & Evans)** 2. Section 11.5 **(Benn & Evans)** 3. Permafrost **(Ency Quat Sci)** 4. Thermokarst Topography **(Ency Quat Sci)**
10 Nov	Lec7: History of climate change + climate change **Field trip reports** due in class *before* 2:10pm	1. Understanding Quaternary Climatic Change **(Ency Quat Sci)** 2. Thermohaline Circulation **(Ency Quat Sci)** 3. Milankovitch Theory and Paleoclimate **(Ency Quat Sci)** 4. The Last Interglacial **(Ency Quat Sci)** 5. Eyles, N. (2008). Glacio-epochs and the supercontinent cycle after ~3.0 Ga: Tectonic boundary conditions for glaciation. **Palaeogeography, Palaeoclimatology, Palaeoecology** 258(1-2), 89-129.
17 Nov	Lec8: Snowball Earth	1. Eyles, N & Januszczak, N. (2007). Syntectonic subaqueous mass flows of the Neoproterozoic Otavi Group, Namibia: where is the evidence of global glaciation? **Basin Research** 19(2), 179-198. 2.Eyles, N. (2004). Frozen in Time: Concepts of 'Global Glaciation' from 1837 (die Eiszeit) to 1998 (the Snowball Earth). **Geoscience Canada** 31(4), 157-166
21 Nov	DROP DATE	
24 Nov	Lec9: Poster presentations **Poster projects** due in class *before* 2:10pm	Individual or group posters will be displayed and each individual/group will have a set time period during which to remain by their poster for questions. The rest of the time you will be free to roam about and look at the other posters/ask questions.
1 Dec	Lec10: Canadian climate + review	1. Eyles, N. (2002). Ch 17 "Glaciation of Southern Ontario". **Ontario Rocks**, Fitzhenry and Whiteside, 339p. 2. Eyles, N. & Miall, A. (2007). Ch 9 "Cool Times: the Ice Sheets Arrive". **Canada Rocks: The Geologic Journey**, Fitzhenry and Whiteside, 512p. Both texts are available for free on *short term loan* at the UTSC library.

Textbooks:

Benn, D.I. & Evans, D.J.A. (2005). **Glaciers and Glaciation.** Arnold (Hodder Headline Group; Oxford University Press). 734p. Available for ***free*** on *short term loan* at the UTSC library, **or** buy it at the UTSC bookstore.

Encyclopedia of Quaternary Science (***free*** *online* through the University of Toronto library catalogue at http://simplelink.library.utoronto.ca/url.cfm/27789)

Eyles, N. (2002). Ch 17 "Glaciation of Southern Ontario". Ontario Rocks, Fitzhenry and Whiteside, 339p. Available for ***free*** on *short term loan* at the UTSC library.

Eyles, N. & Miall, A. (2007). Ch 9 "Cool Times: the Ice Sheets Arrive". Canada Rocks: The Geologic Journey, Fitzhenry and Whiteside, 512p. Available for ***free*** on *short term loan* at the UTSC library.

Various journals: For example- 'Basin Research', 'Geoscience Canada' and 'Palaeogeography, Palaeoclimatology, Palaeoecology' (all of these journals are available ***free*** *online* through the University of Toronto library catalogue *online journals* http://www.library.utoronto.ca/utsc/)

Poster presentations: These poster presentations can be done as either individual or group work. The posters can be printed out onto a (*maximum*) '4 foot by 4 foot' piece of poster paper. Traditionally this can be most cheaply done at the Copy Katz printers at SW209 - it is usually about 3.99 per square foot so you are looking at a cost of approximately $60 total amongst your group members. Please submit your poster for printing *at least* 48 hours in advance of the due date. Topics will be announced in class and more details will follow on BB.

Field trip: We will be taking a one day field trip within Ontario. Bus transportation is necessary and will require a small fee. We will depart at 7am on Oct 20th, returning late in the evening. More information about the field trip report will be given during lecture and on BB.

What to do if you miss a lecture/trip/midterm test/due date? Within ONE WEEK of the missed deadline lecture/test/trip/lecture please bring a *completed U of T medical form* (available under Course Documents on BB) as well as a brief *letter* explaining when you fell ill, when you returned to school and how your illness prevented you from meeting your deadline/test/trip/lecture to Pat Woodcock in SW644 (woodcock@utsc.utoronto.ca, Mon-Fri 9-5 with lunch 1-2pm). Please mark the envelope containing this information to the attention of EESC31 Lisa TUTTY.

AccessAbility: The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services as soon as possible: UTSC campus AccessAbility http://www.utsc.utoronto.ca/~ability/ or St. George Campus DisAbility disability.services@utoronto.ca or http://studentlife.utoronto.ca/accessibility.

Academic Integrity: Academic integrity is one of the cornerstones of the University of Toronto. It is critically important both to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you, the students within this community, and the value of the degree towards which you are all working so diligently. According to Section B of the University of Toronto's Code of Behaviour on Academic Matters 53 which all students are expected to know and respect, it is an offence for students:

- To use someone else's **ideas or words** in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit plagiarism.
- To include false, misleading or concocted **citations** in their work.
- To obtain **unauthorized assistance** on any assignment.
- To provide **unauthorized assistance** to another student. This includes showing another student completed work.
- To submit their own work for credit in **more than one course** without the permission of the instructor.
- To falsify or alter any **documentation** required by the University. This includes, but is not limited to, doctor's notes.
- To use or possess an **unauthorized aid** in any test or exam.

There are other offences covered under the Code, but these are by far the most common.

Please respect these rules and the values which they protect. It is your responsibility to ensure that your work maintains academic integrity. If you have any concerns please see the instructor before a potential problem arises. Please familiarize yourself with the Code (http://www.governingcouncil.utoronto.ca/policies/behaveac.htm) and also with the handout "How not to plagiarize", available in the Course Documents section on BB.

At the University of Toronto academic dishonesty can result in a *mark of zero, a reduction in final grades, denial of privileges, a monetary fine, failure in the course, suspension,permanent record, a recalling of degrees/diplomas and certificates, or expulsion.*