

University of Toronto-Scarborough

EESB20 - Sedimentology & Stratigraphy

Winter 2016-2017

Instructor: Dr. Heidi Daxberger, Room EV 466, email: heidi.daxberger@utoronto.ca, Tel: 416-208-5136

Office hours: Mondays, 11 am – 12 pm, EV446

Teaching Assistant: Vikash Narine

Lectures: **Tuesdays 1 pm – 3 pm Room: IC 326**

Labs: **Tuesdays 3 pm – 5 pm Room: EV224**

Wednesdays 9 am – 11 am Room: EV224

Overview:

This course will provide you with an integrated overview of the formation of clastic and carbonate sedimentary rocks, as well as an overview of the main depositional environments in which these rocks form.

During this course we will be covering rock classifications (material & texture), principles of sediment transport including fluid hydrodynamics and development of primary and secondary sedimentary structures of clastic sediments, and the various mechanisms for the formation of carbonaceous sediments. After covering the basic principles we will turn our focus to the interpretation of ancient and recent sedimentary rock formations regarding their depositional environments (facies analysis). Furthermore, we will discuss the application and principles of sequence stratigraphy and what information we can gain about local and global sea level changes. The gained knowledge will then be used for an integrated analysis and interpretation of the depositional processes in southern Ontario during Paleozoic times.

By the end of the course students should have a thorough understanding of depositional processes, the environments in which they operate and the sedimentary record they produce. Students will also develop skills in the following areas:

- Problem solving and data analysis
- Laboratory methods for textural analysis of sediments and core samples
- Classification and identification of the various sedimentary rocks
- Field description and logging sediments and sedimentary rocks (weather permitting)
- Interpretation of sedimentary facies and structures
- Lab report writing

Course structure:

During a weekly two-hour lecture (Tuesdays from 1-3 pm) I will introduce the theoretical background needed for facies and sequence stratigraphic analysis and interpretations. During the two-hour lab (section 1 on Tuesdays, 3 - 5 pm and section 2 on Wednesdays, 9-11 am) students will learn the fundamentals of field and laboratory analysis of sedimentary rocks, including: sedimentary rock classification and identification, textural analyses and sedimentary structure interpretation, preparation of stratigraphic logs (possibly: core logging, outcrop logging if weather permits in end of

March), stratigraphic correlation, facies analyses and interpretation of paleo-environments. If the weather permits I will organize a one-day field trip (possibly to the Niagara region).

Literature:

Good to get: **Sedimentary Rocks in the Field – A Practical Guide, M.E., Tucker, 4th edition (or latest edition), Wiley-Blackwell**

Text (course reserve):

- Sedimentology and Stratigraphy, G. Nichols, 2009, Wiley
- Principles of Sedimentology and Stratigraphy, S. Boggs, latest edition, Prentice Hall
- Sedimentary Geology, An Introduction to Sedimentary Rocks and Stratigraphy, D.R. Prothero & F. Schwab, 3rd edition, 2014, Freeman
- Facies Model 4, N.P. James & R.W. Dalrymple, 2010, Geological Assoc. of Canada

Course Schedule:

Week	Date	Lecture	In-class exercises (Tuesday, Wednesday)	Notes
1	Jan. 3	Introduction (classification sediments and sedimentary rocks)	No lab	
2	Jan. 10	Sedimentary rock textures/fabrics, primary sedimentary structures/bed forms, fluid flow	Lab 1: Clastics - grain size analysis	
3	Jan. 17	Clastics (fossils/trace fossils) + Carbonates intro (organic: marine, freshwater, cooled environments, vs. inorganic precipitation)	Lab 2: Clastics – Rock ID (texture, grain size, sed. structures) & interpretation	
4	Jan. 24	Carbonates and fossils/trace fossils	Lab 3: Carbonates & Fossil ID	Quiz 1
5	Jan. 31	Others: biogenic and chemical sediments (radiolarite, evaporites: marine-non-marine, chert, iron stones, phosphorites)	Lab 4: ID - Carbonates, fossils & chemical sediments	
6	Feb. 7	Facies models, facies analysis, depositional environments: continental: fluvial and lacustrine environments/processes)	Lab 5: Stratigraphic log 1, 2, 3	
7	Feb. 14	Continental: alluvial and aeolian environments and processes	Lab 6 + 7: Log correlation (Geology Southern Ontario)	
8	Feb. 21	Thanksgiving – Reading Week		
9	Feb. 28	Midterm (in class)		
10	March 7	No Lecture - PDAC Visit	No Lab – PDAC Visit	
11	March 14	Deltaic (continental) and marginal marine: beach/barrier/shallow marine environment/process (fossils)	Lab 6-7: Log correlation (Geology Southern Ontario)	Quiz 2
12	March 21	Tide-storm-dominated shelf/continental slope/ deep marine env./processes	Lab 8-9: Literature Review + Discussion of Geology of Southern Ontario	
13	March 28	Introduction to Facies Analysis, Basin Analysis and Sequence Stratigraphy	Lab 9: Bell Ringer + Correlation and interpretation of Ontario geology (Summary)	

	March 31- April 3	Date TBA: Field Trip – Niagara-Port Colborne Region	End of Term	
14	April 3	Final Exams		

Marking Scheme:

Group (2 -3 students) presentations	5%
Laboratory exercises 9 (9x4%)	36%
Field trip (if applicable, otherwise added to lab)	5%
i-clicker	4%
Bell Ringer	2%
Midterm	20%
Final exam	28%
<u>2 x 2% Online Quizzes</u>	4%
Total	100%

Lectures and in-class exercises:

ALL students are expected to attend ALL lectures, which include graded in-class exercises.

It is the responsibility of the student to ensure that notes are obtained for any classes missed.

1-Day Field Trip – if weather permits !!! - Location to be announced:

This field trip is mandatory for all students. A fee for transportation will arise, which we will keep as low as possible. Furthermore, we are outdoors and therefore some preparations are needed:

- Be prepared for any kind of weather (sun vs. rain: rain jacket, sun screen, hat)
- Sturdy footwear (at least running shoes, ideally hiking boots) -> **NO open-toed shoes, sandals, or heels!!!**
- Adequate clothing (long pants, layers)
- Safety goggles or light tinted sun glasses
- Daypack with an adequate amount of water and lunch (+ smaller snack)
- If possible small camera, field book (e.g. small notebook), pencil & pen

Additional safety equipment (e.g. hard hats, additional safety goggles) required for the trip, will be supplied by the department.

Presentations:

In group 10-15 minute presentations (2-3 people, max. 15 slides) based on the offered topics or an adequate topic regarding glacial geology. No topic can be assigned twice. The submission of a short hand out is required.

i-clicker (Lecture participation) – Individual submission:

i-clickers are mandatory for this class and they will be used for participation marks during the lectures (I-clicker). Total **participation is worth 4% of the final grade** (grade is not based on right answer, but participation). We will start using/testing the I-clickers in the first week. Graded participation will start in the **second week (Lecture 2)**. You can miss up to 20% of the I-clicker participation without losing grades. If your participation is between 80-70% off all lectures, you will get the full 4%. If your participation is between 70 and 50% you will get 2% of the participation mark. If your participation is below 50% no participation marks will be given (0%). **Each student can only use their own clicker! Submitting answers for a fellow student, who is not present during class, is an offence covered under the code of Academic Integrity (see section below)!**

Bell-Ringer Test – Individual Work:

In the course schedule above you will find a date for a Bell Ringer Tests (worth 2% of final grade). This test will be held in preparation for the final exam. The c. 20 minute bell ringer will test your rock and fossil ID skills and is based on the lecture/lab samples. Before the Bell Ringer happens, the lab (ESCB 224) will be open to look at the lab samples again.

Study Questions & Geodictionary:

I will post a set of study questions and a geodictionary (for you to fill out) on each course topic, which should help you to identify the important course information, study for the quizzes and exams, prepare you for the field trip and to keep on top of the material.

Library Services:

Research Help: University of Toronto Scarborough Library

Staff at the UTSC Library will be happy to help you find the resources you need for your assignments, and learn the research skills you will need for success at university.

Research help is available by phone, e-mail, chat, or in-person in the Library.

For more information, please see the Library's Help Guide for UTSC

Students: http://guides.library.utoronto.ca/utsc_help

Need in-depth or department specific assistance? Contact Sarah Forbes, Liaison Librarian for Physical and Environmental Sciences: <http://uoft.me/smforbes>

Blackboard:

Lecture and lab material will be posted on and Online Quizzes will be done through blackboard. Please check daily for updates. Blackboard: <https://portal.utoronto.ca>

Missed academic work:

If you know that you will miss a deadline then please let me know in advance, as we might be able to work something out. Should you miss a deadline for any term work you will be automatically deducted **10% per day (including weekends)** if you do not follow the following procedure and receive consideration. Within **one week** of the missed deadline you must submit a completed **University of Toronto medical certificate** (available on BB in Course Documents) as well as a **letter from you** describing when you fell ill, how it prevented you from making the deadline and when you returned to school as well as your name and student number and the course code and hand in with the instructor.

Academic Integrity Statement:

Academic integrity is one of the cornerstones of the University of Toronto. It is critically and 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 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.*

Accessibility Needs:

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>.