

University of Toronto-Scarborough
Department of Physical and Environmental Sciences
EESB15H3 Earth History - Fall 2019

Prerequisites: EESA01 Introduction to Env. Sci, EESA06 Planet Earth
Course website: <https://q.utoronto.ca/courses>

Instructor: Dr. Heidi Daxberger, ESCB/EV 466, phone: 416-208-5136, heidi.daxberger@utoronto.ca
Office hours: Monday 12.30 to 1.30 pm and by appointment

Teaching Assistant: Talin Atikian, Raymond Co, Sahar Gholzom

Lectures: Mondays: 2 pm – 3 pm (IC 220)
and Thursdays: 7 pm - 8 pm (IC 220)

Lab Exercises: Section 1 - Tuesdays: 8 am - 10 am (IC 120)
Section 2 - Thursdays: 8 am - 10 am (IC 300)
Section 3 – Fridays: 8 am – 10 am (IC 120)
First lecture is on Thursday Sept. 5, 7 - 8 pm in IC 220

Overview:

In the first half of this course you will learn about the building blocks of our planet and the most important geological processes and concepts that underlie Earth's formation and evolution. Then we will move on to learning about the 4.56 Billion year-long evolution of our planet during which we will hear about global events and process, but often will focus on the evolution of the North American Continent in a bit more detail.

We will be starting with the tiniest building blocks of our planet, chemical elements and minerals, and move on to how and where rocks (e.g. igneous, sedimentary and metamorphic rocks) are formed and how these can help us deciphering Earth's historical record of the past 4.56 billion years. We will discuss how the study of plate tectonics emerged and how this process constantly reshapes our planet's surface. Preservation of long dead organisms (fossils) and rock records help us to delineate exactly these plate tectonic movements and therewith the evolution of Earth's continental masses we all live on today.

The rock record and accumulated knowledge of short- and long-term geological processes, as well as rock and sediment properties, becomes more and more important as the human population grows. We are in dire need of a clear understanding of processes such as plate tectonics/rock deformation process (e.g. earthquakes), formation of natural resources (e.g. minerals, oil/gas), fresh water reservoir formation (porous rock). All this we can learn from our planets past so we hopefully use and protect all resources as efficiently as possible and most importantly are more informed on how to protect our environment for future generations.

Part of this course are two 1-Day field trips to Port Colborne (Niagara Region, Ontario), where we will practice the learned skills such as rock and fossil description and identification. At this field site we will discuss what insight the rocks can give us regarding paleo-environments and possible plate tectonic events that took place in NE-Northern America during the Devonian time period.

My biggest course goal is to make you all more aware of your environment and what it can tell you. Our planet is beautiful and its development is one big riddle. And everywhere are clues in form of minerals, rocks, fossils (etc.) for you to investigate. With their help we can figure out what happened in most recent past or even billions of years ago.

This course also aims to introduce and develop the following geo-scientific and soft skills so you as a student:

will be able to/has developed:

- use geology specific terminology
- explain basic geologic concepts and processes (e.g. rock formation, plate tectonics...)
- apply the learned knowledge regarding geological concepts and methods during lab exercises and the field trip.
- describe, identify and differentiate between important minerals, rocks types and fossils, as well as drawing conclusions about their formation (lab exercises, field trip).
- retrieve and interpret basic geologic information from geological maps, cross-sections and 3D box models (lectures, lab exercises)
- relate given data (e.g. fossil occurrence, rock type) to respective geologic processes, environments or historical events (lectures, lab exercises, field trip)
- work in a team during lab exercise as well as the 1-Day field trip.
- peer and self-assessment skills

Literature - Required: H. Levin, The Earth Through Time, 11th edition, Wiley (10th editions is also ok, course reserve)

Other good sources: St. M. Stanley & J.A. Luczaj, Earth System History, Freeman (course reserve)

Lecture Schedule - Subject to change:

Week	Lect Nr.	Lect. Day	Lect. Date	Lect. topic	Lab Date	Lab topic	Quizzes	Quiz topic	Topics		
1	1	Thursday	5.9.	Intro + Minerals					Intro to Geology		
2	2	Monday	9.9.	Elements & Minerals	10.9., 12.9., 13.9.	Lab 1: Minerals	Quiz 1: 9.9.-11.9.	Minerals & Igneous Rocks			
2	3	Thursday	12.9.	Igneous Rocks			Quiz 2: 13.9. - 15.9.	Igneous R & Seds. Weathering / Erosion			
3	4	Monday	16.9.	Igneous rocks & Sediments - Sed. Rocks: Weathering	17.9., 19.9., 20.9.	Lab 2: Igneous Rocks + Minerals					
3	5	Thursday	19.9.	Sediments - Sed. Rocks: Erosion & Transport			Quiz 3: 19.9. - 22.9.	Sed. Rocks & Fossils			
4	6	Monday	23.9.	Sediments - Sed. Rocks: Classification & Structures	24.9., 26.9., 27.9.	Lab 3: Sedimentary Rocks + Minerals					
4	7	Thursday	26.9.	Sediment Structures & Fossils			Quiz 4: 26.9. - 29.9.	Metamorphic Rocks, Geologic processes			
5	8	Monday	30.9.	Metamorphic Rocks	1.10., 3.10., 4.10.	Lab 4: Fossils + Sedimentary Structures					
5	9	Thursday	3.10.	Geol. Principles/Processes + Plate Tectonics			Quiz 5: 3.10. - 6.10.	Metamorphism, Geol. Processes, Plate tectonics, Time			
Field Trips Port Colborne: Oct. 5 or 6, 2019											
6	10	Monday	7.10.	Geol. Time + Geol. Principles/processes	8.10., 10.10., 11.10.	Lab 5: Metamorphic Rocks + Minerals					
6	11	Thursday	10.10.	Geologic time & Hadean Time			Quiz 6: 10.10. - 20.10.	lab 6 prep: geo princ., time, formation of Earth		Midterm Option 1: Saturday 11.10.	
Reading week			12.10.-18.10.			Reading Week					

6	12	Monday	21.10.	Archean	22.10., 24.10., 25.10.	Lab 6: Geologic Time			Earth History		
7	13	Thursday	24.10.	Proterozoic							Midterm Option 2: Saturday 26.10.
8	14	Monday	28.10.	Proterozoic Life & Early Paleozoic processes	29.10., 31.10., 1.11.	NO Labs					
8	15	Thursday	31.10.	Early Paleozoic Processes			Quiz 7: 31.10. - 3.11.	Paleozoic, Lab 7 prep			
9	16	Monday	4.11.	Early Paleozoic Life	5.11., 7.11., 8.11.	Lab 7: Grand Canyon Geology					
9	17	Thursday	7.11.	Late Paleozoic Processes			Quiz 8: 7.11. - 10.11.	Lab 8 Prep (maps) +Paleozoic Times			
10	18	Monday	11.11.	Late Paleozoic Life	12.11., 14.11., 15.11.	Lab 8: Topographic and geologic cross sections and maps					
10	19	Thursday	14.11.	Mesozoic processes							
11	20	Monday	18.11.	Mesozoic processes + Life	19.11., 21.11., 22.11.	Lab 9: Geologic Cross section/map and box model					
11	21	Thursday	21.11.	Mesozoic life			Quiz 9: 21.11. - 24.11.	Mesozoic Times			
12	22	Monday	25.11.	Cenozoic Geol. Processes	26.11., 28.11., 29.11.	9 and 9.30 am, Bell Ringer: Mineral, Fossil Rock ID					
12	23	Thursday	28.11.	Cenozoic Geol. Processes & Life			Quiz 10: 28.11. - 2.12.	Cenozoic Times			
13	24	Monday	2.12.	Recap							
13			3.12. to 5.12	Study Break							

Marking Scheme:

9 laboratory exercises (each 3%)	27%
10 Online Preparation-Quizzes (each 0.5%)	5%
Field trip Report	4% (2% participation, 2% report)
I-Clicker (Lect. Participation)	2%
Glossary (4 entries each 0.5%)	2%
Participation AIM course (bonus)	1%
Bell Ringer (Min., Rock, Fossil ID)	2%
Midterm (in lab sections)	28%
Final Exam (date to be announced)	30%
Total	100% (+ 1% AIM bonus possible)

Lectures and Lab Exercise – Group or Individual Work:

ALL students are expected to attend ALL lectures

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

Nine Lab exercises (**Section 1:** Tuesday 8 -10 am, **Section 2:** Thursdays, 8 -10 am, **Section 3:** Fridays: 8-10am) during which attendance will be taken. Each lab is worth 3 % of final grade (total 27%). During the lab time you will work in group and/or individually but the submission is for each student individually.

For **Lab 1 to Lab 5**, the assignments will include the description and identification of hand samples. Your results are to be submitted in form of a **quercus online quiz** (mandatory: submission by end of lab time). **The lab online quiz submission depends on the availability of a smart phone or laptop during the lab time. Please contact me if this is not possible so other arrangements can be made.**

Lab 6 to Lab 9 are done on paper and will be handed in individually at end of 2 hours.

i-clicker (Lecture participation) – Individual submission (2%):

i-clickers are mandatory for this class and they will be used for participation marks during the lectures (I-clicker). Total participation is worth 2% 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 25% of the I-clicker participation without losing grades. If your participation is between 75 and 50% you will get 1% 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 (2%):

At the end of the term (before the final exam) a Bell Ringer Test will be held (Nov. 26, 28, 29, Group 1: 9 am, Group 2: 9.30 am) in preparation for the final exam. This c. 20 min test will test your mineral, rock and fossil ID skills and is based on the lab samples. Before the Bell Ringer happens, the lab (ESCB 224) will be open to look at the lab samples again.

1-Day Field Trip (4% - 2% Participation, 2% report):

This field trip (dates to be announced during the lectures as soon as possible) is mandatory for all students. A fee for transportation will arise, which we will keep as low as possible.

During the field trip groups of 2-4 students (best 4) will look at the local fossils and rocks (field trip participation 2%). Field trip assignment (report) will be available on quercus at the date of the trip and has to be completed & submitted by October 21 (course dropbox in EV building 2nd floor). This assignment sheet (report) is a group assignment and is worth 2% of final grade.

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, preferably hiking boots) -> **NO open-toed shoes, sandals, or heels!!!**
- Adequate clothing (long pants, layers, rain cloth)
- 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
- See "Intro to field safety" PDF.

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

Quercus Glossary (2%):

Part of the course work is to create **four glossary posts (each 0.5%, total 2%)**. The glossary (make your own geodictionary) is hosted on quercus and will include the most important new terminology of the course. You can select **four terms** from the glossary list on quercus. Student contributions will be monitored by the TAs and instructor throughout and by the end of the term (grade based on quality of term definition – figure/diagram if applicable).

Two of the posts have to be finished by Wednesday October 8 (terms up to lecture 9), 2019 and the second two post by December 5, 2019!

Lecture-Lab Prep. Quizzes on Quercus– Individual Work:

ten online quizzes will be posted. Each quiz will consist of roughly 10 questions and is worth 0.5 % (5% total) of final grade.

Schedule: Topic

Quiz 1: Minerals & Igneous Rocks

Quiz 2: Igneous & Sed. Weathering, Erosion

Quiz 3: Sedimentary Rocks & Fossils

Quiz 4: Metam. Rocks, Geologic Processes etc.

Quiz 5: Metam. R., Geo. Processes/plate tectonics & Time

Quiz 6: Lab 6 Prep. Geo.Principles and Time,
Formation of Earth

Quiz 7: Lab 7 Prep (Grand Canyon), Paleozoic times

Quiz 8: lab 8 Prep: Topo.-/Geo. Map/Cross section,
Paleozoic times

Quiz 9: Mesozoic times

Quiz 10: Cenozoic times

Dates:

Thursday Sept. 9 to Sunday Sept. 11 (midnight)

Thursday Sept. 13 to Sunday Sept. 15 (midnight)

Thursday Sept. 19 to Sunday Sept. 22 (midnight)

Thursday Sept. 26 to Sunday Sept. 29 (midnight)

Thursday Oct. 3 to Sunday Oct. 6 (midnight)

Thursday Oct. 10 to Sunday Oct. 20 (midnight)

Thursday Oct. 31 to Sunday Nov. 3 (midnight)

Thursday Nov. 7 to Sunday Nov. 10 (midnight)

Thursday Nov. 21 to Sunday Nov. 24 (midnight)

Thursday Nov. 28 to Sunday Dec. 2 (midnight)

Study Questions – Group or Individual Work:

I will post a set of study questions 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.

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 penalized **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. Submit the certificate and the letter the instructor. Carefully following this process will allow us to properly consider you for consideration regarding your late/missed work for EESB15.

Final Examination:

The final examination will be 3 hours, is cumulative (1/3 before midterm, 2/3 after midterm) and will be scheduled by the University and held during the December examination period. The exam will contain multiple choice, true and false and short answer questions. Figures, movies and animations are examinable, as are in-class participation/lab type exercises. The exam will be more heavily focused on post-midterm material. The assigned readings are examinable, the material covered in lecture is weighted more heavily than the readings.

Quercus:

Course material will be posted on Quercus. Please check Quercus and your email daily for updates. q.utoronto.ca

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>

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/exercise/quiz. **This includes the use of i-clicker !!!**
- 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.utoronto.ca/~ability/> or St. George Campus DisAbility disability.services@utoronto.ca or <http://studentlife.utoronto.ca/accessibility>.