

University of Toronto-Scarborough  
Department of Physical and Environmental Sciences

**EESC36H3 Petrology - Fall 2022 - InPerson**

<b>Instructor:</b>	Dr. Heidi Daxberger, EV366, <a href="mailto:heidi.daxberger@utoronto.ca">heidi.daxberger@utoronto.ca</a>
<b>Office hours:</b>	<b>Tuesday 12 pm to 1 pm (EV224 or EV466), and by appointment also virtual</b>
<b>Teaching Assistant:</b>	<b>Adriano Roberto</b>
<b>Lectures:</b>	<b>Thursday, 2 pm – 4 pm (BV 361) - In Person</b>
<b>Labs:</b>	<b>Wednesdays, section 2: 9 am – 12 pm, section 1: 1 – 4 pm (EV224) - In Person</b>

Overview:

Petrology is the study of rocks. This course examines the origin, evolution and distribution of “hard rocks”, i.e. igneous and metamorphic rocks. In the classroom portion fundamentals on igneous melt generation, evolution and crystallisation processes will be introduced. Furthermore, we will look at magmatic and metamorphic processes in various plate tectonic settings e.g. generation of new oceanic crust at mid ocean ridges or partial melting and metamorphism along subduction zones. Optical mineralogy (microscopy) using polarizing light microscopes will be used for identification of rock forming minerals, petrographic description and classification of selected rock samples and thin sections. This part of the course will be done in a virtual fashion (digitized thin sections).

Part of this course is an **In-Person field trip** (Bancroft Region) during which we will look at a variety of igneous as well as metamorphic rocks. The region surrounding Bancroft was part of intense deformation, metamorphism and intrusive/extrusive magmatism due to mountain building processes over 1 Billion years ago. During this trip the students will get a chance to practice practical skills such as mineral and rock ID, collecting data in the field and recording field observations.

**Course objectives: After this course you will be able to...**

- **describe** the theory of how polarizing light microscopy works.
- **apply** rock identification and microscopy techniques.
- **explain** concepts on magmatic and metamorphic processes and can **relate** these to plate tectonic settings and thermal controls.
- **apply** the appropriate terminology.
- **describe and classify** the various given samples/data (hand samples, rock thin sections), **analyze** geochemical data and can **distinguish** between the different rock types.
- **to conclude** possible rock formation processes based on the given samples/data.

**Readings:**

- Recommended:**
- Earth Materials - Introduction to Mineralogy and Petrology, Klein & Philpotts, 2013, Cambridge Univ. Press
  - Plate Tectonics – Cont. Drift & Mountain Building, Frisch-Meschede-Blakey – Free Download – Quercus link!
  - Mineralogy-Petrology Lab Manual (B19-C36, Quercus)
  - Polarizing Light Microscopy Guide (Quercus)

**Please see the Quercus Course Homepage for information on Online Open Access Textbooks!**

**Lecture & Lab Schedule - Subject to change (click here for the up to date Google Syllabus):**

Topics	Week	Lect. Date	Lecture Topic	Lab Date	Lab Topic	Quizzes	Quiz Date
Mic Intro	1	Sept. 7 - Wednesday Lab Sessions!	<b>IMPORTANT! First Lab Sessions: Polarizing Light Microscopy Refresher</b>			Quiz 1 - Microscopy Basics - Graded Recap Quiz	Sept. 8 - 11
	1	Sept. 8	<b>Lect. 1: Polarizing Light Microscopy Refresher + Intro to Concept Maps + Igneous Petrology</b>				
Magmatic R	2	Sept. 15	Lect. 2: Intro Igneous Petrology	Sept. 14	Lab 1 Mic Minerals		
	3	Sept. 22	Lect. 3: Ign. Petro	Sept. 21	Lab 1/2 - Mic. Min/Ign.		
	4	Sept. 29	Lect. 4: Ign. Petro + <b>start Geochem Proj.</b>	Sept. 28	Lab 2 - Mic. Ign.	Quiz 2	Sept. 30 - Oct. 2
	5	Oct. 6	Lect. 5: Ign. Petro	Oct. 5	Lab 3 - Mic. Ign.		
<b>Oct. 10-14</b>			<b>Reading Week</b>				
	6	Oct. 20	Lect. 6: Ign. Petro + <b>Geochem Student Presentations</b>	Oct. 19	Lab 4 - Mic. Ign.	Quiz 3	Oct. 21 - 23
	7	Oct. 27	TBA	Oct. 26	Lab 5 - Mic. Ign.	<b>2-3 Day Open Book Take Home Midterm Project</b>	
Metam. R.	8	Nov. 3	Lect. 7: Metamorphic Petro	Nov. 2	Lab 6 - Mic. Meta.		
	9	Nov. 10	Lect. 8: Metamorphic Petro	Nov. 9	Lab 7 - Mic. Meta.	<b>Field Trip - Grenville Metased. Belt: Nov. 12-13?</b>	
	10	Nov. 17	Lect. 9: Metamorphic Petro	Nov. 16	Lab 8 - Mic. Meta.		
	11	Nov. 24	Lect. 10: Metamorphic Petro	Nov. 23	<b>Bell Ringer + Lab 8 - Mic. Meta.</b>	Quiz 4	Nov. 25-27
	12	Dec. 1	Recap	Nov. 30	Lab exam		

**Marking Scheme:**

8 Lab assignments (each 4 %)	28 %	
4 Online Quizzes (each 1 %)	4 %	
<b>Field Trip (2 participation, 3 report)</b>	<b>5 %</b>	<b>Nov. 12-13, 2022 !</b>
Bell Ringer	2 %	
Glossary (8 entries, 0.25 % each)	2 %	
Course Participation (lectures, discussion board)	3 %	
Presentations Geochem Project	3 %	
Midterm	23 %	
<u>Final Exam (lab exam 10%, 3-Day take home Theory 20%)</u>	<u>30 %</u>	
<b>Total</b>	<b>100%</b>	

### **Lectures and Lab exercises:**

There will be one two-hour lecture and three-hour lab sections (section 1 and 2) per week.

**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.***

The purpose of the weekly lab period is to demonstrate practical methods for analysis of structural data and interpretation of geologic maps. **Labs are mandatory (28% - In-lab or homework) for all students and the respective assignments are graded.** During the lab you will have a chance to work more independently to strengthen your knowledge; during the lectures you'll receive more guidance throughout the material. **Lab assignments are to be completed in one week and submitted in the following week's lab.**

The knowledge acquired during the laboratory exercises can also be tested in the **3 Online Quizzes.**

### **Needed for Labs:**

**As we will work in an official LAB space, you will need**

- lab coats
- safety goggles

**The lab assignments include a lot of drawings of microscope thin section views and diagrams, so you will need**

- pencils, color pencils, eraser and a sharpener
- a ruler
- calculator (to calculate composition percentages)

### **Course Participation:**

Your **active course participation is worth 3% of the final grade** (grade is not based on the correct answer, but participation). You can miss up to 25% of the (live - recorded lecture) activities without losing grades, hence if your participation is between 100-75% off all lectures, you will get the full 3%. If your participation is between 75 and 50% you will get 1.5% of the participation mark. If your participation is below 50% no participation marks will be given (0%).

### **2-Day Field Trip – Hastings County (Marmora, Burleigh Falls to Bancroft etc.) – Group Work:**

This field trip is mandatory for all students. **A fee for accommodation (TBA)** will arise, which we will keep as low as possible. Transportation costs are covered.

**During the field trip groups of 2-3 students will look at the local rock formations, describe and ID these, 2% of the grade will be based on trip participation and 3% will be based on your written (group) field trip report. Deadline: TBA.**

**An equivalent alternative assignment will be given if a student cannot participate during the field trip.**

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 sunglasses
- Daypack with an adequate amount of water and lunch (+ smaller snack)
- If possible small camera, field book (e.g. small notebook), pencil & pen

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

**Additional information will be given in a timely manner, as it is still unclear if it will be a 2-day trip (accommodation, equipment such as sleeping bag etc.)!**

### **One Drive Glossary (2%):**

Part of the course work is to create **four glossary posts (each 0.25%, total 2%)**. The course glossary is hosted on One Drive and will include the most important new terminology of the course. You can select **eight terms** from the glossary list. Student contributions will be monitored by the TAs and instructor throughout and by the end of the term (grade based on quality of post: for more info see main glossary page). **Attention: Posts are only graded if submitted by the deadlines!**

**Four of the posts have to be finished by Wednesday October 18 (topics: Igneous rocks + Microscopy), and the second set of four posts by December 5, 2022!**

**Bell-Ringer Test – Individual Work:      November 24, 2022**

In the course schedule above, you will find one Bell Ringer Online Quiz (each worth 2%). In this paper quiz all rock and minerals that we discussed in the course can be included.

**Online Quizzes – Individual Work:**

Three online quizzes will be posted (see course schedule) and each quiz is **1 % (4 % total) of final grade**. Each quiz will consist of roughly 10 - 20 questions (multiple choice, True/False).

**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.

**Final Examination:**

The final examination is cumulative and will be scheduled by the University and held during the December examination period. The exam will be a 3-Day Open Book Take Home Exam Project. This may include open ended questions, critical thinking, drawing of graphs/diagrams, geological data and use of geologic maps/cross sections (etc.). More information will be distributed closer to the end of the term.

**Library Service:**

***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](http://guides.library.utoronto.ca/utsc_help)

**Quercus:**

**Lecture and lab material will be posted on and Online Quizzes will be done through quercus. Please check daily for updates. Link: [q.utoronto.ca](http://q.utoronto.ca)**

**Academic Integrity Statement:**

Academic integrity is one of the cornerstones of the University of Toronto. It is critical 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. **This includes i-clickers!**
- 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](mailto:disability.services@utoronto.ca) or <http://studentlife.utoronto.ca/accessibility>.