University of Toronto-Scarborough

Department of Physical and Environmental Sciences

EESC36H3 Petrology - Fall 2021

Instructor: **Dr. Kirsten Kennedy (Contact through Quercus inbox preferred)**

Office hours: **Monday 3.30 pm to 4.30 pm**

Teaching Assistant: **Adriano Roberto (Contact through Quercus inbox preferred)**

Lectures: **Thursday, 2 pm – 4 pm from Sept 9 (Virtual)**

Labs: **Wednesday, 9am-12pm (Pra001) or 1 – 4 pm (Pra002) from Sept 15 (Virtual)**

NOTE*: This course was initially designed for in-person delivery. However, due to the current situation we are working hard to convert all components of the course (lectures, in-class exercises, laboratory exercises, field trip) into online or virtual components. Therefore, we ask you for your patience and understanding if hiccups occur during online delivery. At the beginning of the course we would love to hear what expectations you have of the course ("Beginning of the course questionnaire").*

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 **virtual 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:

Required text: **- Earth Materials - Introduction to Mineralogy and Petrology,** Klein & Philpotts, 2013, Cambridge Univ. Press

- Plate Tectonics – Cont. Drift & Mountain Building, Frisch-Meschede-Blakey – **Downloadable on Quercus)**

- Mineralogy-Petrology Lab Manual (B19-C36, Downloadable on Quercus)

- Polarizing Light Microscopy Guide (Downloadable on Quercus)

Lecture & Lab Schedule:

Modules	Week	Lab Date	Lab topic		Lecture Date	topic	Quizzes	Quiz Due Date
Microscopy	1	9/8			9/9	Lect. 1: Microscopy Introduction		
Igneous Rocks	2	9/15	Lab time: cont. Microscopy Introduction		9/16	Lect. 2: Igneous Rocks & Earth's Properties		
	3	9/22	Lab 1 - Virtual Microscopy - Minerals		9/23	Lect. 3: Magma, Melting	Quiz 1	Sept 24
	4	9/29	Lab 2 - Virtual Microscopy - Ign. Rocks		9/30	Lect. 4: Magma & tectonic setting		
	5	10/6	Lab 3 - Virtual Microscopy - Ign. Rocks		10/7	Lect. 5: Melting - Crystallization - Phase diagrams	Quiz 2	Oct. 8
Reading Week						Oct. 9 - 15		
	6	10/20	Lab 4 - Virtual Microscopy - Ign. Rocks		10/21	Lect. 6: Magma evolution & tectonic settings	Bellringer!	Oct 22
	7	10/27	Optional Review Time		10/28	Midterm (during lecture time)		
Metamorphic Rocks	8	11/3	Lab 5: Intro to metamorphic minerals (Virtual Microscopy)		11/4	Lect. 7: Metamorphism types and rocks		
	9	11/10	Lab 6 - Virtual Microscopy of Metam. Rocks		11/11	Lect. 8: Metamorphic minerals & textures		
	10	11/17	Lab 7 - Virtual Microscopy of Metam. Rocks		11/18	Lect. 9: Plate Tectonic Processes & Metamorphic Processes	Bellringer!	Nov 19

	11	11/24	Lab time: Virtual Field Trip Report **Due: Dec. 6,** 2020, midnight		11/25	Lect 10: Metam. Mineral Assemblages & Reactions		
	12	12/1	lab Exam		12/2	Lect. 11: Metam. Mineral Assemblages & Reactions	Quiz 3	Dec 3

Marking Scheme:

7 Lab assignments (each 4 %)	28%
3 Online Quizzes (each 1.5%)	4.5%
Virtual Field Trip	4%
Bell Ringer (each 1%)	2 %
Glossary (8 entries, 0.5 % each)	4 %
Course Participation (lectures, discussion board)	4 %
Midterm	15.5%
Lab exam	5
Final Exam	33%
Total	100%

Quercus

This course uses the University's learning management system, Quercus, to post information about the course. This includes posting readings and other materials required to complete class activities and course assignments, as well as sharing important announcements and updates. The site is dynamic and new information and resources will be posted regularly as we move through the term, so please make it a habit to log in to the site on a regular, even daily, basis. To access the course website, go to the U of T Quercus log-in page at https://q.utoronto.ca. Once you have logged in to Quercus using your UTORid and password, you should see the link or "card" for EESB36 Petrology. You may need to scroll through other cards to find this. Click on the EESB36 Petrology link to open our course area, view the latest announcements and access your course resources. There are Quercus help guides for students that you can access by clicking on the "?" icon in the left side column. SPECIAL NOTE ABOUT GRADES POSTED ONLINE: Please also note that any grades posted are for your information only, so you can view and track your progress through the course. No grades are considered official, including any posted in Quercus at any point in the term, until they have been formally approved and posted on ACORN at the end of the course. Please contact me as soon as possible if you think there is an error in any grade posted on Quercus.

Virtual Lectures:

All lectures will be held **live** during the posted hours on the Microsoft Team Platform. Additionally, every session will be **recorded and posted**. Participation during the live lectures is recommended, however based on the current situation not mandatory. The in-class exercises will continue as in other years, but all students can contribute to e.g. discussion board exercises after the fact (a 5-day time limit after the lectures will be applied, to be able to count your contributions for active course participation).

Video recording and sharing (download permissible; re-use prohibited)

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session.

Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation and are protected by copyright. In this course, you are permitted to download session videos and materials for

your own academic use, but you should not copy, share, or use them for any other purpose without the explicit permission of the instructor.

For questions about the recording and use of videos in which you appear, please contact your instructor.

Course Materials, including lecture notes

Course materials are provided for the exclusive use of enrolled students. Do not share them with others. I do not want to discover that a student has put any of my materials into the public domain, has sold my materials, or has given my materials to a person or company that is using them to earn money.The University will support me in asserting and pursuing my rights, and my copyrights, in such matters.

Course Participation:

Your **active course participation is worth 4% of the final grade** (grade is not based on right 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 4%. If your participation is between 75 and 50% you will get 2% of the participation mark. If your participation is below 50% no participation marks will be given (0%).

Virtual Lab Sessions:

Virtual laboratory sessions will also be held online via the Microsoft teams platform. The **TA and course instructor will be present** to assist with practical procedures and guidance during mineral and rock description identification.
All labs samples are digital (virtual 3D samples + digitized virtual thin sections) and therefore, you can be more flexible with your lab work.
However, you will have to submit your lab work within 5 days of the lab during which we worked on the respective slide. These deadlines are in place because we cannot provide feedback until all students have handed in their work.

Quercus Glossary (4%):

Part of the course work is to create **eight glossary posts (each 0.5%, total 4%)**. The glossary (make your own geodictionary) is hosted on Microsoft Teams and will include the most important new terminology of the course. You can select **eight 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 post: for more info see glossary main page on quercus).
Attention: Posts are only graded if submitted by the deadlines!
Four of the posts have to be finished by Thursday October 28 (topics: Igneous rocks + Microscopy), and the second set of four post by December 6, 2020!

Bell-Ringer Test – Individual Work:

In the course schedule above, you will find two Bell Ringer Online Quiz (each worth 1%). A Bellringer is a special type of fast-paced timed quiz where you will simply need to provide a single name of a rock or mineral. Usually, you have about 1 minute per sample. The purpose is to test your quick ID skills.

Online Quizzes – Individual Work:

Three online quizzes will be posted (see course schedule) and each quiz is **1.5 % (4.5% total) of final grade**. Each quiz will consist of roughly 8 - 15 questions (multiple choice, True/False).

Virtual Field Trip – Hastings County (Marmora, Burleigh Falls to Bancroft etc.) – Group Work:

During the virtual field trip (**4% of final grade**) groups of 2-3 students will look at the local rock formation, describe and ID these.

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 **5% *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 **UTSC Verification of Student Illness or Injury**

(https://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf) 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 to the instructor. Carefully following this process will allow us to properly consider you for consideration regarding your late/missed work for EESC36.

Final Examination:

The final examination is cumulative 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.

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

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. **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 Dis*Ability d*isability.services@utoronto.ca or http://studentlife.utoronto.ca/accessibility.

Religious Accommodations

The University has a commitment concerning accommodation for religious observances. I will make every reasonable effort to avoid scheduling tests, examinations, or other compulsory activities on religious holy days not captured by statutory holidays.

According to University Policy, if you anticipate being absent from class or missing a major course activity (like a test, or in-class assignment) due to a religious observance, please let me know as early in the course as possible, and with sufficient notice (at least two to three weeks), so that we can work together to make alternate arrangements.

Grading

Refined Letter Grade Scale	**Grade Point Value**	**Numerical Scale of Marks**
A+	4.0	90 - 100%
A	4.0	85 - 89%
A-	3.7	80 - 84%
B+	3.3	77 - 79%
B	3.0	73 - 76%
B-	2.7	70 - 72%
C+	2.3	67 - 69%
C	2.0	63 - 66%
C-	1.7	60 - 62%
D+	1.3	57 - 59%
D	1.0	53 - 56%
D-	0.7	50 - 52%
F*	0.0	0 - 49%