

University of Toronto-Scarborough

Department of Physical and Environmental Sciences

**EESC36H3 Petrology - Winter 2015**

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**Office hours: Fridays 12 pm to 12.45 pm, and by appointment**

Teaching Assistant: Kurt Hartung

**Lectures: Fridays, 10 am – 12 pm (Room SW 313)**

**Labs: Lab: Fridays, 1 pm – 3 pm (Room SW 313)**

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. Additionally, we will briefly look into the petrology of certain types of sedimentary rocks. Optical mineralogy (microscopy) using polarized microscopes enables identification of rock forming minerals, petrographic description and classification of selected rock samples and thin sections.

Course objectives:

- Development of optical microscopy skills and their application
- Petrographic description (hand sample, thin section)
- Interpretation of petrography regarding conditions of petrogenesis (e.g. mineral phase relations)
- Recognition and interpretation of mineralogical and textural changes in rocks
- Interpretation of metamorphic mineral assemblages and reactions (pressure-temp. conditions)
- Knowledge about metamorphic facies and their distribution due to tectonic and thermal controls
- Properties and formation of chemical sedimentary rocks

To allow us to move through the material in an efficient way, please review the following topics in your Mineralogy EESB19 and Earth History EESB15 notes of the prerequisite:

- Description and ID of rock forming minerals (mineralogy)
- Basics regarding magmatic rocks (common minerals, plutonic vs. volcanic rocks)
- Basics regarding metamorphic rocks (common minerals, metamorphic facies)
- Basics regarding chemical sedimentary rocks (common minerals, precipitation)

**Important:**

**Important point:** our lab exercises are held in a space classified as a *laboratory* – this means that we all **should be dressed in lab coats – please bring them for tutorials (labs) and wear them at all times.** Another consequence: **there is no eating or drinking in the lab.** There is also a desk in front of SW313 where you can leave your snacks and drinks.

**Readings:**

**Required text:** **Earth Materials – Introduction to Mineralogy and Petrology,**

**C. Klein & A. Philpotts, 2013, Cambridge Univ. Press**

**Additional (Course reserve):** Introduction to Optical Mineralogy, W. D. Nesse, 2013, Oxford Univ. Press

**Lecture & Lab Schedule - Subject to change:**

<b>Week</b>	<b>Date</b>	<b>Lecture</b>	<b>Lab</b>	<b>Notes</b>
1	Jan. 9	Introduction – Structure of Earth and Petrology		
2	Jan. 16	Igneous Petrology (origin of magmas, magmatic processes and chemical evolution of magmas)	Lab 1: Rock types, Phase diagrams	
3	Jan. 23	Igneous Petrology (origin of magmas, magmatic processes and chemical evolution of magmas, Tectonic-igneous rock association)	Lab 2: Intro to the use of a polarized and microscope, rock forming minerals	
4	Jan. 30	Igneous Petrology (Tectonic-igneous rock association, mineralogy of magmatic rocks, classification)	Lab 3: Microscopy igneous rocks / phase diagrams	
5	Feb. 6	Igneous Petrology (Classification, texture of igneous rocks & field relations)	Lab 4: Microscopy igneous rocks / phase diagrams	Quiz 1
6	Feb. 13	Metamorphic Petrology (Intro to metamorphism, mineralogy of metamorphic rock)	Lab 5: Microscopy igneous rocks / phase diagrams	
7	Feb. 20	Thanksgiving – Reading Week		
8	Feb. 27	In-class Midterm		
9	Mar. 6	Metamorphic Petrology (Classification, deformation and texture of metamorphic rocks)	Lab 6: Microscopy metamorphic rocks / mineral assemblage diagrams	
10	Mar. 13	Metamorphic Petrology (Metamorphic reactions and	Lab 7: Microscopy metamorphic rocks / mineral	Quiz 2

		metamorphic facies)	assemblage diagrams	
11	Mar. 20	Metamorphic Petrology (Metamorphic reactions and metamorphic facies)	Lab 8: Microscopy metamorphic rocks / mineral assemblage diagrams	
12	Mar. 27	Brief overview of Petrology of Sedimentary rocks (Mineralogy)	Lab 9: Microscopy metamorphic rocks / mineral assemblage diagrams	Quiz 3
13	April 3	Closed – Good Friday		
14	April 10	Final Exam Period starts	<b>Final Exam</b>	
15	April 17	Final Exams		
16	April 24	Final Exams		
17	April 25	Break Starts		

**Marking Scheme:**

**Adjustment**

**(March 23, 2015)**

9 Lab assignments (each 4%)	36%	lab 5-9 is worth 6% each	46% (total)
3 Online Quizzes (each 2%)	6%		
Midterm	23%		
Final Exam	35%	<u>-10% of practical part exam</u>	<u>25%</u>
Total	100%		100%

March 23, 2015:

Adjustment of marking scheme necessary because no separate time slot could be provided for practical portion of final exam (2.5 to 3 hours for microscopy), some of the microscopes are defect -> not enough available to provide each student individually with a microscope for final exam .

Adjustment was announced in class on Friday March 13, and voted on in class on March 20<sup>th</sup> (Friday).

Adjustment: 10% of final exam grade (which is the equivalent of the practical portion of the exam) will be reallocated onto the five microscopy labs (practical part of lab = equivalent to practical portion of final exam).

The students voted (more the 80% of students were in class) and agreed to the adjustment.

**Lectures and Lab exercises:**

**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.**

**Labs are mandatory for all students and the respective assignments are graded.** During tutorials you will have a chance to work more independently in order to strengthen your knowledge; during the lectures you'll receive more guidance throughout the material. The knowledge acquired during the laboratory exercises can also be tested in the 3 Online Quizzes.

### **Required lab materials:**

- A drafting compass (for drawing cycles and arcs)
- A drafting ruler, small scissors, pencils, eraser
- A notebook for tutorials and practice (having some simple drafting paper, without lines or squares, is a very useful for this course)

### **Study Questions:**

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 to the secretary in SW 644; Mon-Fri 9-5 (lunch 1-2) [jterakita@utsc.utoronto.ca](mailto:jterakita@utsc.utoronto.ca). Joanne Terakita collects these, but will not make a decision on the cases. 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 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](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>

### **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](mailto:disability.services@utoronto.ca) or <http://studentlife.utoronto.ca/accessibility>.