SIO 152 Intro to Petrology & Petrography
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Lectures 9 – 10:20 (live via Zoom, all lectures will be recorded & uploaded to Canvas)
Lab 10:30 – 1:30*

Due to the online-only requirement, the lab component will comprise various activities. A large part of the labs will be short answer/essay questions based on assigned readings and problem sets. Hopefully, some labs will be demos of how to use the petrographic microscope (if I'm able to get access to campus in a few weeks). Other labs will involve image analysis of thin section scans and other microanalytical data, use of online "virtual microscopy" resources, and live demos on the petrographic microscope.

Lab components:
Critical Thinking Questions (CTQ)
- Following lecture, and in conjunction with your reading, provide short answers to the questions
- Turn in through Canvas

Problem Sets (PS)
Lab exercises (LAB)

Following lecture, there will be a lab session where I will provide the week's lab exercise and instructions. In general, you will have 1 week to complete any assigned Problem Set. You are allowed to work together/communicate with each other to work on the Problem Sets. However, each student is required to turn in their own Problem Set.

You are not required to meet virtually during the scheduled lab sessions, but I will be available during that time via email and Zoom for questions.

Please be aware that a) this is my first time teaching petrology, b) this is the first time I'm teaching online, and c) this is probably the first time any petrology professor has had to "pivot" their class, and lab, to online in an extremely short timeframe. There will be hiccups and burps along the way. I also understand that you, as students, are probably experiencing a lot of stress and anxiety with the current situation. Let's all be patient with each other. The emphasis is on concepts and not on memorizing factoids or getting all the answers "right." My goal for you in this class is that you will walk away at the end of spring quarter with a basic and foundational knowledge of igneous and metamorphic petrology.

Grade breakdown: 20% midterm, 20% final, 60% lab components (end-of-chapter questions, problem sets, lab exercises, etc.)

Required readingss (all uploaded as pdfs on Canvas): Best (2nd edition; occasional readings from 1st edition). Glazner, Plate Tectonics & Petrology (in progress text by Allen Glazner, professor emeritus at UNC Chapel Hill).

All assigned readings are required, and should be thought of as a minimum. (You are encouraged to read things that are not assigned!)

Please do not share or circulate any of the lecture materials, readings, or any other course material (including recorded lectures) outside of anyone enrolled in the class.

The Syllabus below is tentative and subject to change.

WEEK	DATE	LECTURE TOPIC	LAB	READING	PROBLEM SET
1	3/31	Intro: magma structures (surface expressions) Melting in the Earth (earth structure, deep origin of magma)	No lab during WEEK 1	Best Ch. 1 Best Ch. 11 (pp. 283-290) Glazner Ch. 1 Best Ch. 2	Read assigned chapters, turn in CTQ #1
	4/2	Plate tectonics & petrology Mineralogy & Composition of Rocks	No lab during WEEK 1		
2	4/7	Classification of igneous rocks: importance of Si, major elements	LAB: **Digital image processing & ternary plots** Image analysis of peridotite SEM maps. Determine phase abundances in Photoshop or ImageJ. Plotting on ternary diagrams.	Best Ch. 2 Best Ch. 3	
	4/9	Classification of igneous rocks: texture Trace elements	LAB: Continue from Tuesday	Best Ch. 4	PS#1 Basic petrology calculations: minerals, modes, norms, whole rocks classification. Recasting minerals into oxide components
3	4/14	Melting & crystallization: the “simplest” case at mid-ocean ridges Intro to model systems & phase diagrams: binary eutectic melting of Fo and Di – analog for MORB	LAB: **Optical mineralogy** review: Uniaxial and Biaxial minerals	Glazner Ch. 3, 4 Best Ch. 5	PS #2 Phase diagram exercise: Fo-En-Si system as a model mantle & basalt genesis
	4/16	Phase diagrams cont’d: binary peritectic system Fo-Di-Si Phase diagrams, melting, crystallization	LAB: **Minerals in mafic & ultramafic rocks** Mantle rocks in thin section Basalt and gabbro in thin section		
4	4/21	Subduction zones: volcanic rocks	LAB: Subduction zone rocks in hand sample & thin section **Granites & QAPF**		

	4/23	Subduction zones: plutonic rocks	LAB: Subduction zone rocks continued		PS #4 AFM diagrams and fractional crystallization: The Tholeiitic and Calc-alkaline series
5	4/28	LECTURE MIDTERM (1 hr)			PS #5 Igneous Rocks Synthesis: looking at 60,000 real rock data
	4/30	OIBs, intraplate magmatism	LAB: **Si-undersaturated rocks** in hand sample & thin section		
6	5/5	The transition between igneous & metamorphic rocks: Migmatites – melting & deformation Peridotites again – rheology of the mantle & lithosphere	LAB: **Igneous rock fabrics** in hand sample & thin section: Order of crystallization, microtextures & what we can infer from them	Chapters from Passchier & Trouw (Microtectonics)	PS #5 Crystal Plasticity
	5/7	Rock deformation – near the solidus & just below Plastic deformation, recovery, recrystallization	LAB: Igneous rock fabric		
7	5/12	Metamorphic petrology concepts I Facies	LAB: Metamorphic rocks I – survey of metamorphic facies in hand sample		
	5/14	Metamorphic petrology concepts II Chemical aspects			
8	5/19	Metamorphic rocks: Rock Associations, structures, field relations	LAB: Metamorphic rocks I – metamorphic minerals & assemblages		
	5/21	Metamorphic rocks: Fabrics & deformation			
9	5/26	Metamorphic petrology – In the Field: rock associations, structures, field relations	LAB: TBA		
	5/29	Metamorphic petrology – continued			
10	6/2	Bringing it all together – history of Earth through petrology Geochronology & Isotope Geochemistry – a brief introduction	LAB: TBA		
	6/4				