

Geology 255: Petrology

MW 8:30–9:40 AM, F 8:30–9:30 AM, Mudd 73

Lab: W or Th 1:00–5:00 PM, Mudd 73

Spring 2005
Carleton College

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Lab Assistants:
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A famous geologist once said, “rocks are where you find them.” This course is not just about rocks, but where you find them and why. This course focuses on the chemical evolution of the solid earth. Why are continents granitic and oceanic crust basaltic? How do we know the composition of the mantle? Why is Earth chemically and mechanically stratified? These are some of the big questions we will attempt to answer in this course.

Week		Topic	Reading
1.	M, Mar. 28	Introduction to petrology and heat flow.	Ch. 1
	W, Mar. 30	Heat flow; Common igneous minerals, textures, and classification.	Ch. 2 & 3
	F, Apr. 1	Common igneous minerals, textures, and classification; Plate tectonic settings of igneous and metamorphic rocks.	Ch. 4
	Lab	Lab #1: Common igneous minerals and textures	
2.	M, Apr. 4	An introduction to thermodynamics.	Ch. 5
	Due Monday:	Problem Set #1: Geothermal gradients.	
	W, Apr. 6	An introduction to thermodynamics.	Ch. 6
	F, Apr. 8	Phase diagrams: binary systems.	
Lab	Lab #2: M&M magma chambers; layered mafic intrusions		
3.	M, Apr. 11	Phase diagrams: binary systems.	
	Due Monday:	Problem Set #2: Igneous rock classification	
	W, Apr. 13	Phase diagrams: ternary systems.	Ch. 7
	F, Apr. 15	Phase diagrams: ternary systems.	
	Lab	Lab #3: Layered mafic intrusions	Ch. 12
Due Friday:	Common igneous minerals and textures		
4.	M, Apr. 18	The evolution of magmas: major and minor element geochemistry.	Ch. 8-11
	Due Monday:	Problem Set #3: Binary phase diagrams	
	W, Apr. 20	The evolution of magmas: major and minor element geochemistry.	
	F, Apr. 22	No Class: Keck Meeting	
Lab	Lab #3: continued		

5.	M, Apr. 25	The mantle and oceanic lithosphere.	Skim Ch. 13-15
	Due Monday:	Problem Set #4: Ternary phase diagrams	
	W, Apr. 27	Catch-up and review.	
	F, Apr. 29	One-hour exam	
	Lab	Lab Exam	
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	April 30 – May 3	Field Trip! Baraboo, Wisconsin. Great Petrology!	
	Sat – Tue		
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6.	M, May 2	Mid-Term Break	
	W, May 4	Metamorphism, metamorphic facies, and isograds.	Ch. 21-22,24-25
	F, May 6	Metamorphism, metamorphic facies, and isograds.	Skim Ch. 23
	Lab	Lab #4: Metamorphic minerals and textures	
	Due Friday:	Layered Mafic Intrusions Papers	
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7.	M, May 9	Using linear algebra to solve petrologic problems.	
	Due Wednesday:	Problem Set #5: Mineral formulae	
	W, May 11	Metamorphic reactions and equilibrium.	Ch. 26
	F, May 13	Schreinemakers rules.	
	Lab	Lab #5 – Alta Stock; Metamorphic rock suites	Ch. 29
	Due Friday:	Problem Set #6: Balancing reactions	
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	Sat & Sun,	Field Trip! Morton gneiss and the Minnesota river valley.	
	May 14 & 15		
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8.	M, May 16	Work day	
	W, May 18	Work day	
	F, May 20	Go to GSA?	
	Lab	Lab #6: Metamorphic rock suites	
	Due Friday:	Problem Set #7: AFM/Schreinemakers	
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9.	M, May 23	Work day	
	W, May 25	Work day	
	F, May 27	Work day	
	Lab	Lab #6 - continued	
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10.	M, May 30	Catch-up and review.	
	Due Monday:	Metamorphic rock suite papers	
	W, June 1	One-hour exam	

Text: *An Introduction to Igneous and Metamorphic Petrology*, by J.D. Winter, 2001.

Evaluation: One-hour exams (2) – 15% ea.
 Problem Sets (7) – 30%
 Labs (4) – 20%
 Rock Suite papers (2) – 20%