

GLY 302 – Petrology (WI)

(Spring, 2007)

Instructor: Dr. Robert Darling

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Office: 323 Bowers

Office Hrs. Tuesday: 9:00 am - 11:30 am.

Thursday: 9:00 am - 11:30 am.

Lecture Room 339 Bowers Hall, Tuesday & Thursday, 11:40 am to 12:55 pm.

Lab Room 333 Bowers Hall, Tuesday, 1:15-4:05 pm.

Website <http://web.cortland.edu/darlingr/class/petrology/index.html>

Texts: 1) Blatt and Tracy, 2005, *Petrology: Igneous, Sedimentary and Metamorphic*: 3rd Ed., Freeman.
2) *Minerals in Thin Section*, Perkins, D. and Henke, K.R., 2000, Prentice-Hall, Inc.

Course Description

Petrogenesis of igneous, metamorphic and sedimentary rocks; description and classification and interpretation based on hand specimens and thin-section. Three lecture hours and three hour laboratory; required all-day field trip. Prerequisite: GLY 301. (4 cr. hr.)

Course Attendance Policy

There is no formal attendance policy. However, exam questions are derived from lecture material. Therefore, students who regularly attend lectures will have a decisive advantage over those who do not.

Field Trip Attendance Policy

The field trip is required. Failure to attend the field trip will result in an "Incomplete" grade for the course. The incomplete grade can be made up the following year by attending the field trip. An incomplete grade in GLY 302 can prevent you from: 1) graduating if you are a senior, 2) student teaching if you are a Junior Adolescent Ed major, or 3) receiving financial aid.

Evaluation of Student Performance

Your final course grade will be based on two hour exams, a cumulative final exam, three laboratory quizzes, three writing assignments including an 11 p. term paper, and an oral presentation. The relative weight of each is outlined below along with letter grade numerical equivalents. All course requirements (including the field trip) must be completed to receive a grade.

Breakdown of final grade:

15 % 1st Hour Exam	15 % Laboratory Rock Quizzes (each = 5 %)
15 % 2nd Hour Exam	25 % Writing Assignments [2p. proposal (5%), 11p. term paper (15%), 2p. reflection(5%)]
20 % Final Exam (cumulative)	10 % Oral Presentation

<i>Grades =</i>	A+ = 97-99	B+ = 87-89	C+ = 77-79	D+ = 67-69	
	A = 94-96	B = 84-86	C = 74-76	D = 64-66	
	A- = 90-93	B- = 80-83	C- = 70-73	D- = 60-63	E = 0-59

Students with disabilities

If you are a student with a disability and wish to request accommodations, please contact the Office of Student Disability Services located in B-1 Van Hoesen Hall or call (607) 753-2066 for an appointment. Information regarding your disability will be treated in a confidential manner. Because many accommodations require early planning, requests for accommodations should be made as early as possible.

GLY 302 – Petrology Course Objectives

At the end of this class, each of you should be able to:

- 1) Classify igneous rocks and interpret their textures in thin section and hand specimen.**
(lab. exercises on *Plutonic and Volcanic Igneous Rocks*)
- 2) Interpret binary and ternary igneous phase diagrams.**
(lab. exercises on *Simple Binary Phase Equilibria*, and *Complex Binary & Ternary Phase Equilibria*)
- 3) Make use of the phase rule.**
(lab. exercises on *Simple Binary Phase Equilibria*, and *Complex Binary & Ternary Phase Equilibria*)
- 4) Understand igneous processes such as fractional crystallization and partial melting.**
(lecture on *Fractional Crystallization & Partial Melting*)
- 5) Understand the relationship between plate tectonic processes and magma sources.**
(lectures on *Fractional Crystallization & Partial Melting; Origin and Rise of Magma*)
- 6) Classify sedimentary rocks and interpret their textures in thin section and hand specimen.**
(lecture on *Sedimentary Rocks and Classification*; laboratory on *Sedimentary Structures*)
- 7) Understand the controls on and significance of textural maturity**
(lecture on *Sedimentary Provenance and Environments*)
- 8) Understand the chemical and physical controls on sediment formation and deposition.**
(lectures on *Sedimentary Rocks and Classification; Sedimentary Provenance and Environments*)
- 9) Classify metamorphic rocks and interpret their textures in thin section and hand specimen.**
(lecture on *Petrogenetic Grid, Facies, Isograds*; laboratory on *Metamorphic Rocks*)
- 10) Understand the significance of index minerals, isograds and mineral assemblages.**
(laboratories on the *Petrogenetic Grid, Metamorphic Isograds*)
- 11) Understand the role of external variables (temp. and pressure) on mineral assemblages.**
(lectures on *Metamorphic Controls [P + T]; Experimental Metamorphic Petrology*)
- 12) Understand the role of compositional variables (bulk and fluid) on mineral assemblages.**
(lecture on *Bulk Rock Composition Controls, Phase Rule; Oxidation and Fluid Composition Controls*)
- 13) Understand the relationship between tectonic processes and metamorphic environments.**
(lectures on *Metamorphism and Plate Tectonics, PT Paths; Ultra High Pressure Metamorphism*).

Date	Lecture	Assign.	Laboratory
Jan 23*	Mineral / Melt behavior, the Phase rule	Ch. 4	H2O-KCl experiment.
Jan 25*	Binary systems, w/ or w/o solid solution	Ch. 4	
Jan 30*	Complex Binary and Ternary Systems	Ch. 4	Simple Binary Phase Equilibria
Feb 1	Complex Ternary systems	Ch. 4,5	
Feb 6	Fractional crystallization & Partial melting	Ch. 5,6	Complex Binary & Ternary Equilibria
Feb 10	Classific. and Chemistry of Igneous Rocks	Ch. 2,3	
Feb 13	Origin and rise of magma; granite plutons	Ch. 1,2	Plutonic rocks (HS+TS)
Feb 15	Mantle rocks, Ophiolites, layered intrusions	Ch.7,9,10	
Feb 20	Basaltic volcanic processes	Ch. 8	Plutonic rocks (HS+TS)
Feb 22	Rhyolites, Andesites	Ch. 9,10	
Feb 27	Undersaturated igneous rocks		Volcanic rocks (HS+TS)
Mar 1	FIRST HOUR EXAM	Ch.11,12	
Mar 6	Sedimentary rocks and classification	Ch.13,14	Ig. rock qz. , Clastic rocks (HS+TS)
Mar 10*	Clastic sed. rocks: sandstones, cong.		
Mar 13	Spring Break, no lecture.		Spring Break, No Lab.
Mar 15	Spring Break, no lecture.	Ch. 15	
Mar 20*	Clastic sed. rocks: mudrocks.	Ch. 13	Sedimentary structures
Mar 22	Sedimentary Provenance and Environments	Ch. 16	
Mar 27	Crystalline sedimentary rocks (lms + dolo)	Ch. 16	Crystalline sedimentary rocks (HS+TS)
Mar 29	Crystalline rock environments + interpret.	Ch. 17	
Apr 3	Evaporites + banded iron formations		Evaporites + banded iron formations
Apr 5	SECOND HOUR EXAM	Ch.18,19	
Apr 10	Petrogenetic grid, facies, isograds	Ch. 19	Sed. rock quiz , Meta. rocks (HS)
Apr 12*	Metamorphic controls: P + T	Ch. 21	
Apr 17	Metamorphic controls: phase rule	Ch. 21	Meta. rocks (HS), Petrogenetic grid
Apr 19	Bulk rock composition controls	Ch. 21	
Apr 24	Oxidation and Fluid composition controls		Meta. Rocks (HS+TS) Thermobarometry I
Apr 26*	Mineral changes during metamorphism		
May 1	Metamorphism and Plate Tectonics, PT paths	Ch. 24	Oral Presentations (PowerPoint req.)
May 3*	Ultra high pressure metamorphism		
May 5*	Field trip to Adirondacks		
May 8*	Contact metamorphism + metasomatism		Meta. Rock quiz
May 12	FINAL HOUR EXAM (Cumulative) (Saturday; 1:00 pm to 3:00 pm)		

HS = hand specimen; TS = thin section

All laboratory exercises are to be turned at the end of the lab period.

- *Jan 23 Topics for writing assignment distributed.
- *Jan 25 Topic for writing assignment selected by student / instruction in GeoRef database.
- *Jan 30 Selection of papers reviewed by Dr. Darling / students commence gathering of papers.
- *Mar 8 1st writing assignment due (2 page proposal).
- *Mar 20 Writing assignment 1 returned.
- *Apr 12 2nd writing assignment due (11 page term paper).
- *Apr 26 Resubmission of 2nd Writing assignment due.
- *May 3 Return of resubmission of 2nd writing assignment.
- *May 5 Saturday field trip departs at 7:00 am.
- *May 8 3rd Writing assignment (2 page reflection) due date.