



GLY 4310C
PETROLOGY OF IGNEOUS AND METAMORPHIC ROCKS
4 credits

PREREQUISITES:

GLY 2010 and 2010L or equivalent. One semester college chemistry and one semester college physics. Satisfactory completion of GLY 4200C, Mineralogy (C or better). All students should have these courses **before** taking GLY4310C. Students are strongly advised to take one year of college chemistry. **Students who choose to ignore prerequisites often do poorly.**

TERM: Spring, 2020

COURSE TYPE: Classroom course (web assisted, but not online)

CRN: 12148

LOCATION: Lecture SE 417 Lab SE 435

TIME AND PLACE:

LECTURE: T, R 12:30 - 1:50 SE 417

LABORATORY: T 2:00 - 3:50 SE 435 (Section 12761)

Class begins Tuesday, January 14, 2019

DATES: January 14, 2020 to May 5, 2020 excluding January 20 and March 7 to 13, 2020

INSTRUCTOR:

Dr. David L. Warburton

SE 466

(561) 297-3312

E-mail Warburto@FAU.EDU

Please note: Under State of Florida law, all e-mails to or from FAU are public records.

Do not say anything in an e-mail you would not want to see in a newspaper, etc.

Office Hours: T, R 9:00-11:30 a.m., Friday 11:00-noon or by appointment

GRADUATE TEACHING ASSISTANT:

Jyothirmayi Palaparathi

SE 420

(561) 297- 3250

Office Hours: T, 9:00-12:00 a.m., R, 2:00-5:00 p.m.

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COURSE DESCRIPTION:

The identification of the rock-forming minerals in thin sections. Rock textures and the interpretation of the origin and later geological history of igneous and metamorphic rocks. Discussion of chemical equilibria, and the phase rule. Laboratory investigation of selected rock samples. Lecture and laboratory.

COURSE OBJECTIVES::

This course provides geology majors with basic background in silicate mineralogy, petrology and optical petrography. Students will become familiar with textures, processes, occurrences, and principles that will allow them to describe igneous and metamorphic rocks, and interpret their origin and later geological history. The laboratory serves to familiarize students with silicate minerals, and igneous and metamorphic rocks in both hand specimen and thin section. The course provides background in one of the areas that appears on the Professional Geology license examination.

COURSE EVALUATION:

The laboratory will count 38% of your total grade. The two lecture midterms will count 14% each, or 28% of the total grade. The lecture final will count 18%. Pop-quizzes will count 6%. Homework will be worth 4%. Attendance (lecture and laboratory) will be worth 6%. All examinations must be taken on the date scheduled, beginning at the start of the class period. Any exception to this policy must be arranged in advance with the instructor, only in truly unusual circumstances. If no prior arrangement is made and an examination is missed, the student will receive a grade of zero. All homework assignments are due at the beginning of the class period on the due date.

GRADING SCALE:

The grading scale used is as follows:

93-100 % - A	80-82.9 % - B-	67-69.9 % - D ⁺
90-92.9 % - A-	77-79.9 % - C ⁺	63-66.9 % - D
87-89.9 % - B ⁺	73-76.9 % - C	60-62.9 % - D-
83-86.9 % - B	70-72.9 % - C-	< 60 % - F

Attainment of the lowest grade average in any category will assure that your grade is not lower than the indicated grade, with one exception. **Anyone failing the laboratory examinations will receive a grade no higher than D⁺**, regardless of the overall score. For geology majors, a grade of less than C must be repeated in order to graduate. Note that this includes grades of C-.

Examinations will be returned and discussed in class. If you miss a class, you may come to the instructor's office during office hours. Grades will not be posted. Overall grade distributions and class averages are posted on the examination key, which will be available on the course web pages after the examination.

Incomplete grades will be given only when a student is unable to complete the course within the semester due to unforeseen circumstances, with a considerable impact on the student's life, and beyond the student's control. Students must be passing the course when the event occurs. Such events are rare. Therefore, incomplete grades are rare.

Attendance at the laboratory sessions is mandatory, and is essential for satisfactory performance in the course.

LATE WORK AND MISSED EXAMINATIONS:

Exams will be announced at least one week in advance. It is the student's responsibility to take the tests on the announced date. Failure to take any test will result in a grade of zero (F) on that test.

Participation in University-approved activities, including athletic or scholastics teams, musical and theatrical performances, and debate activities, are excused without penalty but arrangements to make-up work missed due to these absences must be made in advance. The same policy applies to work missed due to religious observances. Make-up tests and quizzes will be given under truly unusual circumstances, which involve a problem or problem beyond the students control, and which could not be foreseen a reasonable time in advance of the examination. Students who know of a problem are urged to contact the instructor two weeks before the examination, to see if alternative arrangements can be made. Anyone missing a quiz or exam must contact the instructor as soon as possible after the exam. Do not wait until the next class! Make-up exams are often in different format than the original examination. Similarly, homework and lab assignments are due on the date announced when the assignment is made. **Late assignments will be heavily penalized.**

CLASSROOM ETIQUETTE:

University policy on the use of electronic devices states: "In order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular telephones and pagers, are to be disabled in class sessions."

ATTENDANCE POLICY:

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting

DISABILITY POLICY STATEMENT:

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS)-in Boca Raton, SU 133 (561-297-3880); in Davie, LA 203 (954-236-1222); or in Jupiter, SR 110 (561-799-8585) -and follow all SAS procedures.

COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS): Center Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to <http://www.fau.edu/counseling/>

CODE OF ACADEMIC INTEGRITY POLICY STATEMENT: Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see [University Regulation 4.001](#).

TEXTS:

Required: Principles of Igneous and Metamorphic Petrology, second edition, John D. Winter, Prentice Hall, 2009. This book was listed on Amazon on January 3, 2020 for \$90 (used hardcover, from an Amazon reseller). If you buy a used copy, be sure you get the second edition. It is also available in a variety of electronic formats, including a Kindle edition for \$79.99.

Required: Manual of Mineral Science, Cornelis Klein and Barbara Dutrow, 23rd edition, John Wiley, 2007. ISBN: 978-0-471-72157-4. Most students will have this book from the Mineralogy course.

ADDITIONAL SUPPLIES:

One hand lens (10 X) - should have a metal case - 20 X is also useful but 10 X is better for most purposes. See Field Equipment page on the web site for a list of possible sources. Most students will have this from Mineralogy. They are also available from Amazon. You are strongly advised to get one with a metal case.

HOLIDAYS:

Martin Luther King Jr. Birthday, January 20, 2020 (does not affect this class)

Spring Break, March 7-13, 2020

COURSE WEB PAGES:

Web pages for the course are located at

http://cosweb1.fau.edu/~warburton/Spring2020/GLY4310_S20/index_4310_S20.html

An enhanced syllabus, an index page with a great deal of information, a laboratory schedule, and other documents are located at this site. Notices, including any changes in dates, etc. will be posted on the web site. Students need to check this site frequently (at least twice per week).

EXAMINATION SCHEDULE:

There will be two midterms and a comprehensive final examination for the lecture part of the course. Exams will be announced at least one week in advance. The laboratory work will also be tested. The following is a tentative examination schedule, subject to revision.

The approximate schedule of lecture examinations is as follows - actual examination dates may vary in accordance with the above outlined policy:

First Midterm: Thursday, February 6, 2020 12:30-1:50

Second Midterm: Thursday, March 26, 2020 12:30-1:50

Final examination: Thursday April 30, 2020 10:30 - 1:00

Lecture exams consist of a variety of questions, including true-false, multiple choice, matching, fill-ins, problems, definitions, and occasional essay or discussion questions.

The approximate laboratory examination schedule is as follows:

Lab Midterm 1 - Silicate Minerals - February 11 2020

Laboratory Midterm 2 - Igneous Rocks - March 31, 2020

Laboratory Final - Metamorphic Rocks- Tuesday May 5, 2020 1:15 - 3:45 p.m.

Laboratory quizzes and examinations are hands-on exercises involving the identification of minerals and rocks, and determination of specimen properties, including optical properties using the petrographic microscope.

LAB REPORTS:

All lab reports will be due at the beginning of the laboratory session one week after the laboratory meets unless otherwise specified. Late lab reports will be heavily penalized. Attendance at laboratory sections is mandatory. Anyone missing a laboratory session without a valid, verifiable excuse will be penalized 20% on that laboratory. Students arriving more than five minutes late for a laboratory session will be penalized 10% on that assignment. Students leaving the laboratory early without permission are also subject to penalty.

SPECIAL COURSE REQUIREMENTS:

The laboratory must be left clean and neat. Any food or drink brought into the laboratory must be disposed of properly. Failure to properly maintain laboratory cleanliness will adversely affect a student's grade.

REFERENCE LIST

The following books are on three-hour reserve in the library. They should prove useful if you are having trouble with a particular subject area, or would like more information.

Igneous Petrology - I.S. Carmichael, F.J. Turner, and J. Verhoogan
QE 461.C37

The Interpretation of Igneous Rocks - K.G. Cox, J.D. Bell, and R.J. Parkhurst
QE 461.C68

Origins of Igneous Rocks - P.C. Hess
QE 461.H47 1989

Pyroclastic Rocks - R.V. Fischer and H.-U. Schmincke
QE 461.F55

Petrology of Metamorphic Rocks - R. Mason
QE 475.A2 M394

Metamorphic Petrology - F.J. Turner
QE 475.T89 1981

Petrogenesis of Metamorphic Rocks - H.G.F. Winkler, fourth edition
QE 475.A2 W5613 1976

Week #	Lecture Topic(s)	Reading
<u>1</u>	Introduction, Silicate Minerals, Nesosilicates, Sorosilicates, Cyclosilicates, Inosilicates	Read Klein and Dutrow, Chap 18, pp. 434-482 Read Klein and Dutrow, Chap 19, pp.483-553
<u>2</u>	Phyllosilicates, Tectosilicates (slides 69 -98) Petrology Introduction (all) Petrology: Fundamental Concepts Classification and Nomenclature of Igneous Rocks	<u>Read Winter, Chapters 1 and 2</u>
3	Igneous Rock Textures	Read Winter, Chapter 3
4	Igneous Structures and Field Relationships, Lab Lecture 4 Mid-term 1 Review	Read Winter, Chapter 4 Review Winter, Chapters 5-6
5	Midterm 1 (2/6/20) Igneous Structures and Field Relationships cont	Review Winter Chap. 7, pp. 105-116
6	Return and discuss Midterm 1 Igneous Structures and Field Relationships cont. Reaction Series, Effects of pressure and fluids on melting Lab Lecture 5	Read Winter, Chap. 7, pp. 117-127
7	Reaction Series, Effects of pressure and fluids on melting continued Generation of Basaltic Magma Lab Lecture 6	Read Winter, Chapters 10 and 13
8	Generation of Basaltic Magma, continued Mid-Ocean Ridge Volcanism Lab Lecture 7	Read Winter, Chapter 14, pp. 270-279
9	Discuss HW 2 Mid-Ocean Ridge Volcanism, continued Lab lecture 8 Ocean Intraplate Volcanism	Read Winter, Chapter 14, pp. 279-291

10	Discuss HW 3 Ocean Intraplate Volcanism continued Lab lecture 9 Review for Midterm 2	Read Winter, Chapter 14, pp. 291-300
11	Midterm 2 (3/26/20) Return and discuss Midterm 2 Lab lecture 9 Introduction to Metamorphism	Read Winter, Chapter 21, pp. 446-458
12	Introduction to Metamorphism continued Return and review Lab Midterm 2 Lab lecture 10	Read Winter, Chapter 21, pp. 458-469 Read Winter, Chapter 22
13	Introduction to Metamorphism continued High Strain Rocks Metamorphic Facies Lab lecture 11	Read Winter, Chapter 25, pp. 537 -546
14	Metamorphic Facies continued Lab lecture: 12	Read Winter, Chapter 25, pp. 546-557
15	Metamorphic Facies continued Final Examination review	
	Final Examination (4/30/20) 10:30 a.m - 1:00 p.m	

Students will be expected to complete homework problems as assigned. The schedule of topics to be discussed is subject to change during the semester, depending on the needs of the class. Students should check the “Activity Sheet” on the course web site prior to each lecture. The Activity Sheet provides an up-to-date listing of all work done in the lecture portion of the course.