



GLY 4200C
MINERALOGY AND CRYSTAL CHEMISTRY
4 Credits

PREREQUISITES

GLY 2010 and 2010L or equivalent. General Chemistry 1 and Lab (CHM 2045 & 2045L or equivalent) and General Physics 1(PHY 2048 or equivalent). All students should have these courses before taking GLY4200C. Students are strongly advised to take one year of college chemistry. **Students who choose to ignore prerequisites often do poorly.** This course is a prerequisite for GLY 4310C, Petrology of Igneous and Metamorphic Rocks.

TERM: Fall, 2019

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

CRN: 12277

LOCATION: Lecture SE 417 Lab SE 435

Times

Lecture: Wednesday, Friday 9:30-10:50 a.m.

Laboratory: Section 15489, Wednesday, 11:00-12:50 p.m.

Class begins on Wednesday, August 21, 2019

DATES: August 21 through December 11, 2019 excluding November 28-29, 2018

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: The instructor will be in or around SE466 or 465, or in the class laboratory SE 435, during the following hours each week, beginning August 20, 2019 through December 11, 2019, although Final Exams times may require adjustments after December 5.

M W 1:00 - 4:00 p.m., or by appointment

GRADUATE TEACHING ASSISTANT:

Jyothirmayi Palaparthi

SE 420

(561) 297- 3250

Office Hours: T 2:00-5:00 p.m. and W 1:00-4:00 p.m.

E-mail: jpalaparthi2017@fau.edu

COURSE DESCRIPTION:

This course provides geology majors with basic background in mineralogy and optical mineralogy. Students will become familiar with atomic scale properties, and their usefulness in understanding macroscopic properties, as well as information which can be extracted from minerals concerning the past history of the earth, as well as changes in the earth's environment over time. The laboratory serves to familiarize students with non-silicate minerals and the use of the petrographic microscope.

COURSE OBJECTIVES:

The course provides background in one of the six areas tested on the Professional Geology license examination, and prepares students for the Petrology of Igneous and Metamorphic Rocks course.

COURSE EVALUATION:

Two midterms exams, each worth 15% of the total grade.

A cumulative final exam worth 18% of the total grade. Laboratory assignments and laboratory exams, 36% of the total grade. Homework will be worth 10% of the total grade.

Attendance (lecture and laboratory) will be worth 6%.

GRADING:

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. Such events are rare. Therefore, incomplete grades are rare.

Attendance at the laboratory sessions 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 courseware 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](#).

TEXT:

Manual of Mineral Science, Cornelis Klein and Barbara Dutrow, 23rd edition, John Wiley, 2007. ISBN: 978-0-471-72157-4. The price on Amazon for a new book is \$106.66 (Hardcover), or \$24.80 for a used hardcover, both from Amazon resellers but serviced by Amazon, as of May 7. The J. Wiley book site shows a list price of \$223.95, or \$48.00 for an e-book in Adobe e-book format.

(<http://www.wiley.com/WileyCDA/WileyTitle/productCd-EHEP000641.html>)

Use caution - some used books are marked. Do not buy any edition before the twenty-third, because there were substantial improvements with the new book. All assignments are keyed to the 23rd edition. Books sent from third-party sellers on Amazon may take quite a while to arrive. You need to have a textbook as soon as possible.

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](#) for a list of possible sources.

HOLIDAYS:

Labor Day September 2, 2019 (does not affect this class)

Veteran's Day, November 11, 2019 (does not affect this class)

Thanksgiving Recess, November 28 -December 1, 2019 (does not affect this class)

COURSE WEB PAGES:

Web pages for the course are located at:

http://cosweb1.fau.edu/~warburton/Fall2019/GLY4200C_F19/index_4200_F19.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. The lecture schedule, which summarizes the material covered during lecture, as well as assignments made and their due dates, will be updated after each lecture, and will serve as an up-to-date indicator of course progress. **Students need to check this site frequently (at least once per week).**

EXAMINATION SCHEDULE:

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

First Midterm Exam - Friday, September 13, 2019

Second Midterm Exam - Friday, October 18, 2019

Final Examination - Wednesday, December 11, 2019 7:45 - 10:15 a.m.

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 quizzes following mineral labs, as shown on Lab Schedule for each section

Laboratory Midterm (Symmetry-K & H, Chapter 2, 20-100) - October 9, 2018

Laboratory Final (Optical Mineralogy Techniques) -

Monday, December 9, 2019, 10:30 a.m. - 1:00 p.m.

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

TOPICS COVERED:

Date	Topics Covered	Assignment
8/21, 8/23	Mineralogy Introduction, Mineral Properties	Chapter 1, Chapter 2 pages 19-35, Piezoelectricity and Pyroelectricity handouts on web page
8/28, 8/30	Lab 2 Lecture, Piezoelectricity, Pyroelectricity Atoms and Quantum Numbers, Periodic table	Chapter 2, 36, Chapter 3, 37-64, Homeworks 1 & 2
9/4, 9/6	Labor Day Holiday , Return and discuss HW 1, Lab 3 lecture, Bonding in Minerals	Chapter 4 66-80 Chapter 6, 109-118
9/11, 9/13	Lab 4 lecture, Bonding in Minerals, Coordination Principle, Return and discuss HW 2, Lab 5 lecture, Radius Determination, Midterm1 Review, Midterm 1	Chapter 5, 90-108, Chapter 7, 156-163
9/18, 9/20	Return and discuss Midterm 1, Pauling's Rules, Composition of the Earth, Mineral compositional variability, solid solution	Chapter 6 109-114 and 118-134, Chapter 7, 143-156 and 163-168
9/25, 9/27	Crystallographic concepts, Internal order and symmetry, Lab lecture 7, Crystal systems	Chapter 6, 134-142, Chapter 9, 182-208, Chapter 10, 217-226 Color in Minerals handout on web page, Homework 3
10/2, 10/4	Crystal growth, Twinning, Lab lecture 8, Color in Minerals, Return/discuss HW3	Chapter 10, 226-244, Homework 4, Magnetism on web page
10/9, 10/11	Return/discuss HW4, Magnetism, Lab lecture 9, Thermodynamics and the Phase Rule,	Chapter 11, 245-252
10/16, 10/18	Midterm 2 review, Unary Phase Diagrams, Midterm 2	Chapter 11, 252 - 262
10/23, 10/25	Return and discuss midterm 2, Binary Phase Diagrams, Lab 11 lecture	Lever rule handout on web page, Homeworks 5 & 6
10/30, 11/1	Binary Phase Diagrams, Return/discuss HW5, Lab 12 lecture, Properties of Light	Chapter 13, 287-294, Homework 7
11/6, 11/8	Properties of Light, Return/discuss HW6	Chapter 13, 294-300, Homework 8
11/13, 11/15	Return/discuss HW7, Lab 13 lecture, Return/discuss HW8, Optical Properties of Minerals, Lab lecture 14	Chapter 13, 300-306, Homework 9
11/20, 11/22	Optical indicatrix, Return/discuss HW9 X-ray crystallography	Chapter 14, 307-321, Homework 10 X-ray crystallography handout on web page
11/27	X-ray crystallography cont., Return/discuss HW 10, Final exam review	Study for final exam
12/11	Final Examination 7:45-10:15 a.m.	

REFERENCE LIST

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

Mineralogy for Students - M. H. Battey
QE 363.2 B33 1975

Modern Mineralogy - Keith Frye
QE 363.2 F79 1974

Mineralogy - John Sinkankas
QE 363.2 S47 1970

An Introduction to Mineralogy for Geologists - W.J. Phillips & N. Phillips
QE 363.2 P44

Mineralogy - Concepts and Principles - Tibor Zoltai and James H. Stout
QE 363.2 Z 65

The book by Frye describes chemical bonding and close packing well in Chapter 1, and has a very good discussion of color and luster in Chapter 5. The Sinkankas book contains excellent descriptions of minerals, including the origin of mineral name, methods of identification, and noteworthy occurrences of type or museum grade specimens. Also included are many illustrations of crystals showing common crystal faces and interfacial angles. The theoretical sections are relatively uncomplicated and thus easier to understand than some textbooks, although detail is sacrificed. The Phillips book contains a great deal of information on crystal structure, a subject not emphasized in this course, and the habits and stereo-representations of many rock-forming minerals. The growth and twinning of crystals is also discussed. The book by Zoltai and Stout was formerly used as the textbook for this course, and contains a wealth of detailed information on many of the theoretical aspects of mineralogy.