

## GLY 314: Mineralogy Fall, 2006

**Credit hours:** 4 units

**Instructor:** Aley El-Din El-Shazly

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**Lectures:** T, Th 11 – 12:15

**Office:** SCI 131

**Tel:** 696-6756

**Lab:** Th: 1:00 – 2:50 p.m.

**For the labs, please plan on spending a minimum of 2 extra hours each week, working on your samples/ thin sections. You are all majors, and you do need to become experts in mineral id!**

**Office hours:** M, W, F: 9:00 – 10:00, 11: - 12; M, T, W: 2:00 – 3:00, Th 3 – 5 (in lab) or by appointment. You could always send me e-mail, and I will get back to you as soon as possible. I also have an open door policy, if you cannot make it to my office hours, and I'm in my office between 9:00 and 4:00 p.m., it doesn't hurt to check with me; ... if I'm free, I'll be more than happy to help you. I strongly encourage you to come and talk to me if you have any problems with the class, so that we can solve them early on!

**General Course objectives:** (1) To develop a basic understanding of (i) chemical bonding and internal structure of minerals, (ii) principles of crystallography, (iii) techniques used for identification of minerals, (2) To develop the ability to identify minerals in hand-specimen and thin section; (3) To understand the different processes of mineral formation; and (4) to develop some appreciation for the application of mineral science to everyday life.

**Textbooks:** The textbook for this course is "Introduction to Mineralogy" by William Nesse, 2000. This textbook is **required!** The lab manual: "Petrography of Igneous & Metamorphic Rocks" by Anthony Philpotts (1989) is **highly recommended**. You will need to buy it anyway for your Ig-Met class, so might as well buy it now!

**Prerequisites:** Geol 110 or 200, **Chem 211, 212**. Please go over the electronic structure of atoms and Bonding before this class!

**Grading:** 2 Tests (Mid-terms) 30%, Final Exam: 30%, Labs (including 2 lab tests & several HW assignments + field trip report) 30%, Lab project: 10%. The final exam will be comprehensive, and will include a few essay type questions as well as short answer (e.g. Compare and contrast; Give reasons for , ..... etc.). The short answer and objective type questions are designed to evaluate your level of understanding and overall knowledge of the subject matter. The few essay questions are designed to show your level of understanding and knowledge, as well as how well you can *organize your thoughts and express yourself in writing*. Both types of questions will require reproducing some of the figures and diagrams that we will discuss in lecture. **Lab tests** and exams will focus on the identification of minerals, crystals and crystal structures, and solving one or two problems. **Optical identification** of minerals (using the microscope) will **weigh heavily** on your grade. The lab project will entail identification of an unknown mineral that each student will be given. All tests will be closed book, unless otherwise stated.

**Grade assignment:** A: > 85%; B: 75 – 84.9%; C: 65 – 74.9%; D: 55 – 64.9%; F: < 55%. Class attendance/ interaction will be taken into consideration in borderline cases. *In general, I do not like to curve!!!*

**Attendance:** Attendance of lectures is expected. You will also have **unannounced quizzes**, which will count for **some %** of your grade (TBA)! *If you have a legitimate excuse for missing my classes, you should try to let me know beforehand!*

**Study tips:** You should take your own notes during class, and should learn how to reproduce many of the figures in your textbook for an exam or quiz. Please feel free to ask questions at any time. Do the **readings** promptly **after** each lecture (the reading list is given in the table below), and familiarize yourself with new terms (you will have to do a bit of memorization; sorry!!!). **Texts** that may be helpful for studying for some parts of this course are kept on reserve in the library. I will also have a few handouts with an outline of my lecture that I will try to keep on line. Use these to organize your own lecture notes after you've done the reading. However, *these handouts are in no way a substitute for the reading assignments!* We will be covering many different topics in this class that are normally covered (though in more depth) in two 3 credit unit courses. You will find that these topics are all inter-related, so you simply **cannot afford to fall behind!!!** In the **Lab**, plan on spending at least two extra hours per week working on your own on the samples provided. There will be a few **homework** problem sets throughout the semester; get an early start on those, and be sure to turn them in on time.

**Other Useful Textbooks:**

- Klein, C., 2002. Mineral Science. John Wiley & Sons.
- W. D. Nesse, 1991. Introduction to Optical Mineralogy. Oxford University Press.
- F. Donald Bloss, 1971. Crystallography and crystal chemistry; an introduction. New York, Holt, Rinehart and Winston.
- W. A. Deer, R. A. Howie [and] J. Zussman, 1983. An introduction to the rock-forming minerals. Longman.
- E. Wm. Heinrich, 1965. Microscopic identification of minerals New York, McGraw-Hill
- M. H. Battey, 1972. Mineralogy for students. Edinburgh, Oliver and Boyd.
- D. L. Bish and J.E. Post, (editors), 1989. Modern powder diffraction. Washington, D.C. Mineralogical Society of America.
- Roger G. Burns, 1970. Mineralogical applications of crystal field theory. Cambridge U.P, London.
- C. D. Gribble, A. J. Hall, 1993. Optical mineralogy: principles and practice. New York, NY : Chapman & Hall.
- Paul F. Kerr, 1977. Optical mineralogy. New York : McGraw-Hill.
- J. Zussman, 1977. Physical methods in determinative mineralogy. London ; New York : Academic Press.

**Some useful web-sites** (List is non-comprehensive; follow links from these sites as need be)

<http://www.uni-wuerzburg.de/mineralogie/links.html>

<http://homepages.udayton.edu/~koziol/resminpet.html>

<http://users.skynet.be/jm-derochette/index2.html>

<http://www.mwrn.com/guide.htm>

<http://minerals.usgs.gov/minerals/pubs/mcs/>

<http://webmineral.com/>

(The last address is for an excellent mineral data base. You will probably learn more from this site than from my class!)

Also check my website for some good photomicrographs that should help you out extensively in your labs.

**The use of Web-CT VISTA:** I will use program Web-CT VISTA for communicating with you all throughout the semester. I will be posting some exercises, comments on graded material, some

spreadsheets/ study guides to help you prepare for mid-terms and finals, .. etc. It is your responsibility to check your e-mail as well as the blackboard site regularly. The program is available from the University's homepage.

**Academic Integrity & Honor Code:** The honor code as defined in the student handbook will be strictly enforced. Violations of this code may result in the assignment of an "F grade" for the class, and further disciplinary action by the Academic Dean.

**Closing thoughts:** I am committed to making this course a positive experience for everyone, so don't hesitate to ask me questions, or approach me with problems. I am also willing to arrange for review sessions in the evenings. Please remember that Mineralogy is your "gateway" to studying igneous, metamorphic, and sedimentary petrology, as well as geochemistry and economic geology! You cannot become a good geologist without a good background in Mineralogy!

**Students with disabilities:**

*Students with a particular learning disability should contact the Disabled Student Services Office (113 Prichard Hall) or the H.E.L.P. office (Myers Hall), both on campus, and should let me know of the special accommodations needed. Every effort will be made by this instructor to accommodate their needs.*

## Syllabus

Week	Lectures*	Topic	Reading
1	1	Introduction	Ch. 1
1	2	Atomic Structure & Bonding	Ch 3
1, 2	3, 4	Physical Properties of Minerals	Ch 6
2	5, 6	Crystallography: I- Space lattices	p. 6 - 17
3	7, 8	Crystallography: II- Morphology	p. 17 – 24
3, 4	9, 10	Crystallography: III- lattices, classes & systems	24 - 37
4, 5	11 - 13	Elements of Crystal Chemistry	p. 57 - 65.
<b>5</b>	<b>14</b>	<b>First MT exam: TBA one week before</b>	<b>~ Sept 26??</b>
6	15, 16	Polymorphism, Polytypism	p. 66 - 69
6	16, 17, 18	Isomorphism, Chemical formula of minerals, Graphical representation of mineral composition.	p. 65; 69 – 73; 172 – 174.
7	19, 20	Formation of Minerals: Crystallization, Nucleation, Growth, Mineral reactions, Pseudomorphism, Exsolution, Metamict minerals, Defect structures	p. 79 - 94
8 - 10	21 - 28	Optical Mineralogy: Theoretical principles; Isotropic minerals; Uniaxial minerals; Orthoscopic vs. conoscopic examination; Biaxial minerals; interference figures; dispersion.	Ch 7
<b>9</b>	<b>23</b>	<b>MT exam # 2: TBA one week before</b>	<b>~ Oct 19???</b>
11 - 13	28 - 35	Systematic Mineralogy: Tectosilicates, nesosilicates, sorosilicates, inosilicates, phyllosilicates	183 – 186; Ch 12; 13; 14; 15; 16.
13	36 -37	Oxides and Hydroxides	Ch. 18
14	38, 39	Carbonates & Sulfates	326 - 345
12	40, 41	Native elements, sulfides & Sulfosalts	Ch. 19; 20
15	41, 42	X-ray diffractometry	Ch 8

**Final Exam: Th Dec. 7, 10:15– 12:15 a.m.**

This syllabus is based on 50 minute lectures. All dates with the exception of the final are tentative and subject to change at the discretion of the instructor.