

Geology 313 - Earth Materials I (3 cr)

Idaho State University

Fall Semester, 2006

Dates, Time, Room: TTh 2:00 - 5:00 (Lect 2:00-3:00; Lab 3:00 - 5:00 pm), PS221

Instructor: Mike McCurry, PS 225, Phone: 282-3960, e-mail: mccumich@isu.edu; web-page: <http://geology.isu.edu/idahorocks/>; office hours: any time door is open or by appointment

Teaching Assistant: Eli Eversole, PS202D, e-mail: everelij@isu.edu

Text: Nesse, W.D., 2000, Introduction to Mineralogy, Oxford University Press, New York, NY, 442pp.

Required Supplies: Good quality 10X hand lense, and small, good quality pen knife.

Course Assessment, Grading and Administration:

Lecture: Two lecture mid-term exams and one final exam. The final exam is comprehensive. All lecture exams will be closed book. Dates and times for the exams are shown in the class schedule.

Lab: Weekly exercises, two midterm exams and comprehensive final exam. Lab exams will be open book, and will be taken in conjunction with Lecture Exams.

Late Labs Policy: Lab and homework assignments must be turned in at prescribed times. Unexcused homework and labs will be penalized 25% for each day they are late. Both instructors must be notified in advance of legitimate reasons for missing or late labs, exams, etc.

Attendance and Class Participation Policy: Regular attendance and active class participation are considered critical parts of your learning experience. You are strongly encouraged to asked questions in class (both lecture and of course the lab). Unexcused absence from class will be penalized one letter grade from your corresponding weekly lab score, for each class not attended.

	Grading*	Grading Scale*
Lecture	- 45%	100-90 = A
2 Midterms and Comprehensive Final		89 - 80 = B
weighted 12.5%, 12.5% and 20% respectively.		79 - 70 = C
Laboratory	- 55%	69 - 60 = D
2 Midterms and Comprehensive Final		<60 = F
weighted 7.5%, 7.5% and 15% respectively.		
Labs (25%)		

Lecture will emphasize basic principles, whereas the laboratory will emphasize aspects of determinative mineralogy as well as hands-on examination and identification of minerals in hand samples and thin section. Prerequisites for this course are CHEM 111 and GEOL 110. Please see the instructor if you have any questions regarding these requirements.

This is a time-intensive, hands-on-oriented class. You should be prepared for significant amounts of work on assignments and readings outside of formal class hours. Assigned reading should be done in advance of the corresponding class. We will try to give you as much access to specimens and lab equipment as we can. If access becomes a problem you should contact Mike or Will for help.

Our program is committed to all students achieving their potential. If you have a disability or think you have a disability (physical, learning disability, hearing, vision, psychiatric) which may need a reasonable accommodation, please contact the ADA Disabilities & Resource Center located in Graveley Hall, Room 123, 282-3599 as early as possible.

Course Objectives:

- An understanding of the nature and formation of solid-earth's raw materials in the context of earth's major tectonic, petrologic, hydrologic and biogeochemical systems
- Nomenclature of materials and their textures, and systems of classification
- Physical and chemical properties of earth materials
- Associations and occurrences
- Understand processes of formation
- Earth materials resources and hazards
- Ability to characterize, record, classify and identify minerals, mineraloids and their textures using field (hand- and outcrop-scale) and petrographic-microscope-based laboratory procedures
- Ability to interpret the origins of the materials based upon your recorded data and sample context

* Times and places for exams are shown in the attached course schedule. Class participation is considered to be an important part of your learning experience. Although no specific credit will be applied to participation, it will be considered in the event of border-line grading cases.

EARTH MATERIALS I - LECTURE/LAB SCHEDULE - FALL, 2006

LAB NO.	DATES	SUBJECT	REQUIRED READING*
1	8/22 due: 2pm 8/29	Introduction; review basics of earth materials	
	8/24	Earth Materials in context: relationships between materials and tectonic, petrologic, hydrologic, and biogeochemical systems	Sen, Ch 1, p. 1-17 Nesse, p. 3-5
2	8/29 due: 2pm 9/5	Intro. to crystallography and crystal systems	Nesse, Ch. 2
	8/31	Crystallography - cont.; mineral morphology	Nesse, Ch. 2 (cont)
3	9/5 due: 2pm 9/12	Crystal chemistry intro. (review of basic chemical principle applied to earth materials; bonding	Nesse, Ch. 3
	9/7	Crystal chemistry, cont. Crystal structure. Linking of anionic groups (polymerization); mineral structural formulas; graphical depictions	Nesse, Ch. 4
4	9/12 due: 2pm 9/19	Minerals and their classification; polymerization Compositional and structural variation representation of chemical data	Nesse, Ch. 5
	9/14	Depiction and interpretation of mineral compositions and relationships	Nesse, Ch. 5-cont.
5	9/19 due: 2pm 9/26	Physical properties of minerals Observing, documenting, and interpreting hand-sample scale. Limitations.	Nesse, Ch. 6
-	9/21	Lect. - mineral formation Review for Lect. and Lab Exams 3-5pm	no new readings
-	9/26	First Lab Exam (2-4 pm)	
6	9/28 due: 2pm 10/3	First Lect. Exam: 2-3 pm Lab: Introduction to optical microscopy Check-out microscopes; basic microscope features and functions; review basic of optics theory	Nesse, p. 114-121
7	10/3-10/5 due: 2pm 10/10	Relief and sign (incl. Becke-line test)	Nesse, Ch. 7 p. 152-155

8	10/10-10/12 due: 2pm 10/17	Petrographic methods	Nesse, p. 121-151 (skim) Lab handout
9	10/17-10/26 due: 2pm 10/31	Preparation and microscopic description and identification of minerals; Systematic mineralogy Systematic mineralogy: Framework silicates	Nesse, Ch. 11, p.183-200 p. 157-159
	10/26	Review for lecture exam	Nesse, Lab: Ch. 12; Review making of lab notes (3x5 cards)
-	10/31	Second Lecture Exam 2-3pm Review for lab exam 3-5pm	no new readings
-	11/2	Lect. - Sheet silicates Second Lab Exam 3-5pm	Nesse, p. 235-239
10	11/7-11/9 due: 2pm 11/14	Other silicates	Nesse, p. 261-265; 277-279; TBA
11	11/14-11/16 due: 2pm 11/28	Other earth materials (carbonates, sulfides, sulfates, oxides, mineraloids)	TBA
		Thanksgiving Vacation! (no class Nov 20-24)	no new readings
12	11/28-11/30 due: 2pm 12/5	Other methods of earth materials analysis	Nesse, p. 160-180
	12/5	Review for Lab and Lecture Finals	
	12/7	Final Lab Exam (THURS 2:00 - 5:00 pm in PS 221)	
	12/14	Final Lecture Exam (THUR 12:30-2:30 pm) PS 221	

* Readings refer to Nesse unless indicated otherwise.

Reference Information (keep this list handy throughout the Semester)

Useful (but not required) books:

Emphasizing processes:

1. Sen, G., 2002, Earth's materials: Minerals and rocks: Prentice-Hall, NJ, 552 pp.
2. Hibbard, M.J., 2002, Mineralogy: A Geologist's Point of View, McGraw-Hill, Boston, 562 pp.

Helpful guides to minerals and mineral identification:

1. Pough, F.H., Scovil, J., and R. T. Peterson, 1998, A field guide to rocks and minerals (Peterson Field Guides), 5th ed., Chapter Pub. Ltd.,
2. Chesterman, C. W., 1979, National Audubon Society field guide to North American rocks and minerals, Knopf, 850 pp.
3. Prinz, M., Mottana, A., and G. Harlow, 1978, Simon and Schuster's guide to rocks and minerals, Simon & Schuster, 607 pp.

Idaho gems and minerals:

1. Ream, LR, 2000, The gem & mineral collector's guide to Idaho: Gem Guides Book Co., 80 pp. ISBN 1889786136
2. Ream, LR, 2004, Idaho Minerals: The Complete Reference and Guide to the Minerals of Idaho, 2nd Ed, Museum of North Idaho Publications, 373 pp., ISBN 0972335633
3. Beckwith, JQ, 2003, Gem Minerals of Idaho (with fieldtrip maps), Caxton Press, 129 pp., ISBN 0870042289

Key web-resources:

1. Organizations:

Mineralogical Society of America. Probably best and most thorough earth-materials site on the web.

<http://www.minsocam.org/>

Also check out the mineral and rock Java apps at this site, they're very thorough, graphically oriented and useful!

Minerals: http://www.minsocam.org/MSA/collectors_corner/id/mineral_id_keyq1.htm

Rocks: http://www.minsocam.org/MSA/collectors_corner/id/rock_key.htm#Key

2. Data and reference information:

Webmineral: Contains more than 5,000 web pages of mineral data and pictures. There are 4,205 individual mineral species; descriptions with links. Also includes information about classification of minerals, determinative tables, X-ray powder diffraction, and links to other sources.

<http://webmineral.com/>

Mindat.org: Similar to Webmineral, but with emphasis on mineral identification.

<http://www.mindat.org/fullsearch.php>

EarthRef.org: The website for Earth Science reference data and models. **GERM - Geochemical Earth Reference Model** Providing a Chemical characterization of the Earth, its major reservoirs and the fluxes between them. **ERESE - Enduring Resources for Earth Science Education.** Promoting, creating and publishing of Enduring Resources for Earth Science Education in a collaboration between school teachers and Earth scientists.

<http://earthref.org>

3. Links (best on the web):

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

3. Jobs (like mineralogy and looking at job possibilities?)

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

4. How did minerals get there names?

<http://www.8ung.at/geologie/eetymol.htm>

5. For rock and mineral collectors:

<http://www.rockhounds.com/> and <http://www.tradeshop.com/gems/index.html>

Supplies:

1. Looking for a hand lens? - I recommend the Hastings Triplet 10X. Also rock-hammers, field notebooks, etc.

Miner's (Idaho): <http://www.minerox.com/>

Amazon.com:

ISU Geology Club

IMNH (Museum)