

Course Syllabus as of November 2, 2015
Geol 2010 – Mineralogy, Fall 2015
Department of Geology and Geophysics, University of Wyoming

Instructor: John Kaszuba	Phone: (307) 766-6065
Office: 1010 Earth Sciences Building (ESB)	Email: John.Kaszuba@uwyo.edu
Class Meets: Tues & Thurs 8:35 – 9:25 am in Geology Building 318	
Office Hours: Mon 2 – 3 pm, Tues 9:30 – 10:30 am, Wed 3 – 4 pm, and by appointment	

Teaching Assistant (all laboratory sessions meet in GE Room 202):
Ryan Herz-Thyhsen (rherzthy@uwyo.edu)
Laboratory Tues 3:10 – 5:00 pm and Wed 1:10 – 3:00 pm
Office Hours, Room GE316 and GE202: Tues 1 – 3p, and by appointment

Prerequisites: CHEM 1020 General Chemistry I, or concurrent.

Course Description: Introduction to rock-forming minerals. Includes introduction to crystallography, crystal chemistry and the occurrence and identification of common minerals, with emphasis on silicates. 3 credit hours (2 hours lecture and 2 hours lab each week).

The Earth is a geological system, and mineralogy serves as the foundation for its study. Minerals are the fundamental building blocks of the Earth. This class provides you with the basis on which you will build your geologic careers! Minerals form the Earth's substrate in which our food grows, they soften our water, they crack hydrocarbons, they cleanse hazardous wastes and they provide us with materials that bring our life above subsistence living. Consequently, it is imperative that minerals be understood and appreciated, even by laypersons. Mineralogy is even more important now as we confront many worldwide issues: the carbon cycle and issues of global climate change; where to store wastes, including radioactive and hazardous wastes and carbon dioxide; and where to locate aquifers for vanishing groundwater resources. Each of us can make a difference when asked to vote on these issues and when discussing these topics with neighbors. In addition, minerals are simply beautiful to observe! This class has been prepared with you in mind and to assist you in your future geologic endeavors. Our efforts into this course are considerable, we expect the same of you. Most of all, we love minerals and mineralogy and hope you will too.

Course Objectives & Outcomes: In this course we have two broad types of objectives, becoming technically competent in mineralogy and developing fundamental scientific competence in quantitative thinking skills important to mineralogy. Technical competence in mineralogy includes the following:

- 1) an understanding of the "language" of mineralogy and its subdisciplines of crystallography and crystal chemistry,
- 2) an understanding of the linkage between macroscopic properties and a mineral's internal structure
- 3) knowledge of the common rock forming minerals, particularly diagnostic physical properties and hand sample identification, geologic context and importance to earth processes, and societal

relevance including economic value and whether exploitation of the mineral poses health consequences.

- 4) An understanding of how we use minerals to decipher the earth's (and other planet's) geologic history and evolution

Fundamental scientific competence in quantitative thinking skills includes the following:

- 1) three-dimensional thinking
- 2) use of graphs and graphical interpretation
- 3) forward and "reverse" thinking
- 4) applying the language and knowledge of mineralogy to solving problems.

Note that these fundamental scientific skills are also important to upper division Geology courses and to the scientific professional in general. Along the way our goal is to help instill an attitude of life-long learning and critical thinking!

Primary Text: Cornelis Klein and Barbara Dutrow, 2007, Manual of Mineral Science (Manual of Mineralogy), Wiley; 23rd edition, 716 pages, **ISBN-10:** 0471721573, **ISBN-13:** 978-0471721574. This book is also on reserve in the Geology Library.

Supplemental material:

- 1) M.D. Dyar, M.E. Gunter, and D. Tasa, 2007, Mineralogy and Optical Mineralogy (<http://www.minsocam.org/MSA/DGTxt/>). This book is on reserve in the Geology Library.
- 2) W.D. Nesse, 2012, Introduction to Mineralogy, 2nd Edition, Oxford University Press. This book is on reserve in the Geology Library.
- 3) Other library reserves and materials as needed.

Note: please read assignments prior to class

Course Assignments and Grading: Grades will be based on a combination of lecture and laboratory exams/quizzes, homework assignments, and laboratory assignments. During the semester there will be two 1-hour exams in the lecture portion of the class. Exam questions will be based on material from lectures as well as from the book. A comprehensive final exam will be held for both lecture and lab (separately).

As professional geologists you will be expected to identify the common rock forming minerals. You will also be expected to know basic properties such as mineral formulas, distinguishing characteristics, modes of occurrence, etc. I will provide you with a list of 120 minerals that you will be responsible for knowing for the course. These are the important minerals that all geologists need to know in order to be successful. Know these minerals, you will be tested on them without the benefit of notes or open books.

Most states require you take one or more tests before you can work independently as a professional geologist. To give you a sense of these tests, and the importance of mineralogy to these tests, each of the lecture exams will contain a few sample questions from tests of the Wyoming Board of Professional Geologists.

Letter grades will be assigned from the final numerical score, derived as follows:

Lecture	Exams (two during the semester)	(50 points each)	100 points
	Final		100 points
	Homework/miscellaneous activities	Varies	40 points
	Total lecture		240 points
Lab	11 Labs	15 points each	165 points
	1 Saturday Field Lab	20 points	20 points
	5 Quizzes	5 points each	25 points
	Final Exam		100 points
	Total Lab		310 points
Total Class			550 points
Extra Credit	Complete set of mineral flash cards	10 points total	

Notice that overall laboratory activities carry more weight than lecture activities (56% vs. 44%). Letter grades will be assigned from the final numerical score. I use standard percentages to assign grades (e.g., $\geq 90\%$ = A, 80-89% = B, etc.). I do not grade on a curve.

Lecture Final Exam: Thursday, December 17, 8:00 – 10:00 am.

Lab Final Exam: Last week of classes during your normal laboratory period.

Attendance Policy: Attendance of labs is mandatory. University sponsored absences are cleared through the Office of Student Life. If you plan to be gone at any time during the semester and your absence will be officially authorized by UW, please contact me beforehand so that we can work out some way for you to make up any assignments. Any absences from class as a result of illness will require proper documentation from your physician.

Conduct: University Regulation 29, change 1, states that the instructor can “establish reasonable standards of conduct for each class which should be made known at the outset.” This class requires engagement and participation. We do not always have to agree with each other, but we will treat each other with mutual courtesy and respect. The College of Arts and Sciences has assembled guidelines for attendance, classroom etiquette (no sleeping or cell phone use!), phone and email protocol, office hours and how to make appointments outside of office hours. Please see the following website for this useful information: http://uwadmnweb.uwyo.edu/a&s/Current/students_teachers_work.htm.

Academic Honesty: UW Regulation 6-802. The University of Wyoming is built upon a strong foundation of integrity, respect and trust. All members of the university community have a responsibility to be honest and the right to expect honesty from others. Any form of academic dishonesty is unacceptable to our community and will not be tolerated [from the UW General Bulletin]. Teachers and students should report suspected violations of standards of academic honesty to the instructor, department head, or dean. Other University regulations can be found at: <http://uwadmnweb.uwyo.edu/legal/universityregulations.htm>.

American Mineralogist Undergraduate Award: The Mineralogical Society of America's American Mineralogist Undergraduate (AMU) Award program recognizes outstanding students who have shown an interest and ability in the discipline of mineralogy. If a student exhibits exceptional achievement in mineralogy during the semester I will recognize this accomplishment by nominating one student for the MSA award. More information on the award is posted on the MSA website http://www.minsocam.org/MSA/Awards/UnderGrad_Award.html - [AMU nomination](#).

Online Resources: We will use *WyoCourses* for the online course website to post announcements, reading material, course syllabus, etc. Consult this website regularly for announcements and other information. Students are automatically enrolled in this course website. Students use their UWYO domain accounts to log into WyoWeb and then access WyoCourses via the link near the top center of the page.

Here are some helpful hints to make Mineralogy easier and more fun!

- 1) **Review Introductory Material in Physical Geology:** Class requires that you have a full knowledge of the rocks and minerals section of your Introductory Geology text. Please re-read this portion of your Physical Geology Book.
- 2) **Attend Class:** You will do much better if you attend class. Lecture material is derived from sources in addition to the text, and mineralogy books can be difficult to understand. Lectures will use visual aids to supplement the text and enhance class presentations. Questions from the class are always encouraged. Please inform me if you are going to be absent from class and get the notes from a friend.
- 3) **Lab:** The lab is the 'hands-on' part of the course. Lectures concentrate on concepts and principles, lab exercises put these principles to use. Therefore, you are required to attend lab. During this time, there is always someone available to help and answer questions! Lab assignments reinforce lecture material and aid in comprehension. They should be thoroughly understood.
- 4) **TA's:** The TA is in charge of the laboratory. Please consult with your TA regarding their policies and preferences for laboratory assignments.
- 5) **Reading:** Reading assignments should be completed prior to the class period as they serve as supplemental material. Bring your questions to class.
- 6) **Communication:** If you have questions, take advantage of the Teaching Assistants and the Professor. Make full use of office hours. Make an appointment to see the professor or the TA if needed.
- 7) **Students and Teachers Working Together:** the College of Arts and Sciences has assembled guidelines for attendance, classroom etiquette (no sleeping or cell phone use!), phone and email protocol, office hours and how to make appointments outside of office hours. Please see the following website for this useful information:
http://uwadmnweb.uwyo.edu/a&s/Current/students_teachers_work.htm

Changes to the Syllabus: The course schedule is an outline of the major topics we will discuss in class. Given the breadth of material that we will discuss and the level of student interest, it may be necessary from time to time to deviate from this course outline. Thus, the schedule will be flexible and is likely to evolve through time, and any significant modifications will be announced in advance in class.

Disability Statement: If you have a physical, learning, sensory or psychological disability and require accommodations, please let me know as soon as possible. You will need to register with, and provide documentation of your disability to University Disability Support Services (UDSS) in SEO, room 330 Knight Hall, 766-6189, TTY: 766-3073.

General lecture Outline and Reading Assignments for Geol 2010 - Mineralogy

#	Date	Lecture Topic	Required Reading Klein & Dutrow	Recommended Reading
1	1-Sept	Introduction, Minerals in Hand Sample, the "Big 9"	Chapter 1	Dyar et al.: Chapter 1 except section on optical classes
2	3-Sept	Minerals in Hand Sample, the "Big 9"	Chapters 2 and 22	Dyar et al.: Chapter 2 Nesse: Chapter 6 and p. 8-10, 204-205
3	8-Sept	Crystallography: Symmetry and Symmetry Operations	Chapters 1 and 6	Nesse: Chapter 2; Dyar et al.: Chapter 4
4	10-Sept	Crystallography: Crystal Systems		
5	15-Sept	Crystallography: Forms, Miller Indices		
6	17-Sept	Crystallography: Wrap Up		
7	22-Sept	Crystal Chemistry: Periodic Table and Chemical Bonding	Chapters 3 & 4	Nesse: Chapter 3 & p. 67-80
8	24-Sept	Crystal Chemistry: Coordination Number, Packing, Solid Solutions, Twinning I	---	---
9	29-Sept	Crystal Chemistry: Coordination Number, Packing, Solid Solutions, Twinning II	p. 90-103	Nesse: p. 81-83
10	1-Oct	EXAM I	---	---
11	6-Oct	Geologic Phase Diagrams	p. 104-108 and Chapter 11	Nesse: p. 83-84
12	8-Oct	Native Elements and Oxides	Chapters 15 and 16	Nesse: Chapters 18 and 20
13	13-Oct	Sulfides		Nesse: Chapter 19
14	15-Oct	Sulfates and Halides	Chapters 16 and 17	Nesse: p. 375-380, 409-413
15	20-Oct	Carbonates		Nesse: p. 359-374
16	22-Oct	Introduction to Silicates	p. 434-438, 575-576	Nesse: Chapter 11
17	27-Oct	Bowen's Reaction Series	---	---
18	29-Oct	Quartz and Silica Minerals	p. 467-470, 534-539	Nesse: p. 231-239
19	3-Nov	Feldspars and Feldspathoids	p. 470-477, 539-546	Nesse: p. 239-258
20	5-Nov	EXAM II	---	---
21	10-Nov	Olivine	p. 438-439, 484-487	Nesse: p. 338-341
22	12-Nov	Phase Equilibria	---	---
23	17-Nov	Pyroxene	p. 446-452, 505-513	Nesse: p. 294-310
24	19-Nov	Pyroxene, start Amphibole	p. 452-456, 514-519	Nesse: p. 310-322
25	24-Nov	Amphibole		

26	26-Nov	Thanksgiving Holiday, no class	---	---
27	1-Dec	Phyllosilicates	p. 456-467, 519-534	Nesse: Chapter 13
28	3-Dec	Garnet, Al-rich silicates (Al ₂ SiO ₅ minerals, staurolite, cordierite)	p. 439-446, 487-495, 503-504	Nesse: p. 341-354, 333-334
29	8-Dec	Ca-Al silicates, accessory minerals	p. 490-491, 496-497, 499-500, 504-505	Nesse: Chapter 15
30	10-Dec	Catch Up and Review	---	---

Laboratory Outline for Geol 2010 - Mineralogy

#	Week of	Lab	Topic	Quizzes/Exams (Closed Book, No Notes)
1	31-Aug	No Lab	First week of classes	---
2	7-Sept	Lab 1	Minerals in Hand Sample (The Big 9)	---
3	14-Sept	Lab 2	Minerals in the Field (Vedauwoo)	---
4	21-Sept	Lab 3	Crystallography	Quiz #1
5	28-Sept	Lab 4	Native elements, oxides, hydroxides	---
6	5-Oct	Lab 5	Sulfides	Quiz #2
7	12-Oct	Lab 6	Carbonates, sulfates, phosphates, and halides	---
8	19-Oct	Lab 7	Quartz, feldspars, and feldspathoids	Quiz #3
9	26-Oct	Lab 8	Minerals in the Field (Laramie Anorthosite Complex). No lab Tues or Wed, field lab on Sat Oct 31	---
10	2-Nov	Lab 9	Olivine, pyroxene, and amphibole	Quiz #4
11	9-Nov	Lab 10	Phyllosilicates	---
12	16-Nov	Lab 11	Al, Ca-Al, and Fe-Mg-Al silicates	Quiz #5
13	23-Nov	No Lab	Thanksgiving Holiday	---
14	30-Nov	Lab 12	Minerals in Rocks and Review	---
15	7-Dec	---	---	Lab Final

Lab 8, Saturday Field Lab: Saturday October 31, weather permitting. Backup date, Saturday November 14, weather permitting. We will leave at 8a and return to campus around 3p. This field lab is required, students who cannot attend must consult in advance with instructors for make-up assignment. This field lab replaces the normally scheduled lab section; labs will not meet Tues 10/27 or Wed 10/28.

Lab Grading: Grades are administered by the TA. All laboratory sections will follow the same syllabus. Laboratory activities required of each student include 12 lab assignments, 5 lab quizzes, and 1 lab final. Lab assignments must be turned in at the beginning of lab to receive credit. Extra credit of 10 points will be awarded to students who develop a complete set of mineral flash cards.

Required Supplies and Materials: Hand lens is available in the lab. However, many of you may want to purchase your own at the bookstore. These will better quality than we have in the lab.