

Mineralogy (51-205)

Course Syllabus Fall 2011

MWF 11:30-12:30 *Harrington Room 217*

Lab M or T 1:50-5:10 *Harrington Room 216*

Prerequisites: GEO 102 or GEO 150 AND CHEM 105 or 109 (may be taken concurrently)

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Office hours: M 9:30-10:30, T 12-1, W 12:40-1:40 and by appointment...I'm here most of the time...check my office door for my schedule.

Texts: Nesse, W. D., 2000, *Introduction to Mineralogy*, Oxford University Press, New York, 442 p.

Wenner, J.M., 2011, *Mineralogy Handbook*, Oshkosh Document Services, Oshkosh, WI.

COURSE GOALS

Welcome to Mineralogy! Mineralogy literally means “the study (or learning or account) of minerals”. Minerals are the **basic building blocks of rocks**; therefore, mineralogy and optical mineralogy provide the foundation for many aspects of your future as a geologist. Every sub-discipline of the geosciences relies on identification of minerals using physical, chemical and optical properties as the basis for analyzing and assessing Earth processes. Ultimately, the goal is for you to be able to apply mineralogy (in rocks and other geologic materials) in your major courses to interpret things like geologic histories and infer geologic processes. By the end of this course you should be able to:

1. Distinguish ~40 rock forming minerals in hand specimen (both single mineral and in rocks) and thin section without the aid of determinative tables.
2. Determine mineral species (other than the 40 mentioned above) using physical and optical properties and determinative tables.
3. Classify minerals based on crystallography, chemistry, systematic mineralogy and associations.
4. Interpret mineralogy of rocks to reconstruct a geologic history.
5. Produce a group presentation (oral and written) about a suite of rocks.

This is really your first “majors” course in the Geology Department. As such, be prepared to be challenged and to spend a significant amount of time devoted to the study of minerals this semester. Don't forget that you have all kinds of resources available to help you, including your classmates, TAs and instructor! Ask for *help* if you need it – I *WANT* you to succeed in this course!

FORMAT OF THE COURSE AND YOUR RESPONSIBILITIES

If you haven't taken a course from me before, you might be surprised by the structure of Mineralogy. I expect ***interaction and participation, and I place a great deal of responsibility for learning on you, the student.*** After all, I can't do your learning for you!

Part of being a sophisticated learner is thinking about how you think (called metacognition) and being aware of how you learn best. Many of us are not aware that we have different preferences for styles of learning (you can take a quiz about how you learn best here: <http://www.engr.ncsu.edu/learningstyles/ilswweb.html> and there are also tips for how to study if you prefer one type of learning).

There is significant evidence that the best learning occurs when students are engaged in active learning (doing things instead of sitting and passively listening); students retain much more when engaged and teaching their peers (e.g., McLeish, 1968). With that in mind, class sessions are designed around activities having to do with the topic at hand. With so many activities in class, one of your responsibilities is to ***come to class prepared (having read the material and completed the D2L or homework assignments).***

Because active learning is most effective when combined with collaborative/cooperative learning (e.g., Johnson et al., 1991; Prince, 2004) and geologists often collaborate, ***you and your classmates will collaborate on many of the assignments. I expect you to treat others with tolerance and respect and to act responsibly and reliably when you work in groups.*** You may not always agree with the folks in your group, but treat them respectfully and learn how to convince naysayers with good evidence and respectful discussion.

Another of your responsibilities is to ***complete assignments ON TIME.*** Every assignment will designate the date that it is due. These are hard and fast deadlines and mean that it is to be completed ***before we start class or lab on that date.*** There are two reasons for holding to deadlines: 1) if you haven't finished the current assignment, you may not be ready for the next one; 2) students like to keep track of their grades and I like to return graded assignments as soon as I can – prompt response from me is impossible if I don't have all assignments. *As with any rule, there are always exceptions. In the back of your Handbook, you will find two “Mineralogy Bucks” for late assignments for any reason – sickness, a funeral, etc. These are good for a 48-hour extension on any assignment (certain conditions apply). But, you only get 2 “bucks”, so use them wisely. I would also appreciate a “heads-up” if you plan to use a “buck” – e-mail, phone, or in person works just fine.*

Should you miss a class, I do expect that you will gather all the important information before the next class session so that you don't hold yourself or your group members back. ***It is your responsibility to find out what you need to do to catch up*** – that's part of the responsibility game. Don't expect that I'm going to smile cheerfully if you saunter into class and say, “What did I miss last class?” (or worse, “Did I miss anything last class?” Oops, big blunder...Makes me feel as if I should reply, “Oh, no, of course not...I made everyone sit around doing useless stuff...”) !!!

MY RESPONSIBILITIES

I've told you what I expect of you, but I also have responsibilities in this course. What can you expect from me? I will ***show up on time, make my expectations for assignments clear,*** and return graded assignments in a timely fashion. I will also do my best to ***help you become more aware of how you learn.*** You can expect me to ***treat you with fairness and respect*** and to ***hold you to high standards and expectations.*** You can also expect that I will ***take an interest in you and look to learn something from you.*** Finally, you can expect me to ***be excited and knowledgeable about mineralogy*** and to ***create interesting and challenging opportunities for you to learn the subject.***

NUTS AND BOLTS OF THE CLASS:

Class meeting times are **Mondays, Wednesdays and Fridays from 11:30-12:30 in H217**. Labs meet at 1:50 on Monday or Tuesday in H216. Please arrive in the classroom on time (or, even a little early) so that we can get started right away.

Please note that there are a few days in October and December when I will be out of town. We will make up class time with take-home exams and a field trip on September 24.

The mandatory field trip for this class will happen on September 24. *Please mark it in your calendar right now so that you can be prepared for it.* This trip will last all day (8am to 7 pm) and you are all invited to come to my house for pizza dinner after the field trip. If you are not able to make it to the dinner, please let me know so I can plan accordingly.

You will need the following items for this course:

- **Textbook:** Nesse, W. D., 2000, *Introduction to Mineralogy* (There are also some supplemental readings that will be provided in lab and at the library).
- **Mineralogy Handbook** (2010): This is a lab manual and course guide. You should bring it to class EVERY DAY.
- **Three ring binder** for all of your assignments. In this course, you will have a “portfolio” binder in which you will keep all of your assignments organized. From time to time, I will collect these portfolios and grade in-class and homework assignments. You might want to get some loose-leaf paper as well.
- **Hand lens/mineral identification tools:** You can purchase one of these from me or the Geology Club. This is one of the most important tools you will have for mineral ID and every geologist should have one. Bring it to lab EVERY WEEK!

INFORMATION ABOUT GRADING

<i>GRADING</i>		<i>GRADING SCALE</i>	
EXAM 1 (material through 10/9)	10%	A.....	92-100%
MINERAL ID EXAM	5%	A-	90-92%
EXAM 2 (material through 11/11)	10%	B+.....	88-90%
EXAM 3 (comprehensive with min ID).....	15%	B.....	82-88%
Labs (1-11)	22%	B-	80-82%
Mineral quizzes	3%	C+.....	78-80%
Lab project.....	10%	C.....	72-78%
In-class assignments and homework	15%	C-	70-72%
Online quizzes (posted on D2L).....	5%	D+	68-70%
Field trip (Saturday, October 10, 2009).....	5%	D.....	62-68%
		D-	60-62%
		F	< 60%

EXAMS:

All exams on “lecture” material will be open-book, take-home exams (see below for exception). The exams involve significant thought and synthesis and are designed to help you learn the material better. ***These exams are NOT collaborative endeavors and should be completed INDIVIDUALLY. Please see the statement on the following page for information about your responsibilities to honestly represent your own work.*** Exams 1 and 2 are worth 10%; Exam 3 (comprehensive) is worth 15% of your grade.

MINERAL ID EXAM:

The sole exception to the take-home exam is the MINERAL ID EXAM. Sometime in early October, you will be asked to ID and write the chemical formula for about 30 minerals (without the crutch of determinative tables). The mineral ID exam is worth 5% of your grade.

LABS:

Each lab can be found in the *Mineralogy Handbook*, available for purchase at the bookstore. The 11 labs are worth 22% of your grade.

- All assignments should be finished by the beginning of lab on the date that they are due (generally one week after they are assigned).
- The lab period for this class is 3 hours – please do not expect to be excused early. In addition, you should expect to spend a significant amount of time outside of the scheduled lab and class periods working on assignments and learning minerals and their formulas. The ONLY way to learn to recognize minerals is by ***practicing and practicing and practicing.***

MINERAL QUIZZES:

For the first few weeks of the semester (and then sporadically after that), we will have a mineral quiz at the beginning of lab. These consist of identification of minerals using every day tools (hand lenses, streak plates, magnets, etc.). Mineral quizzes are worth 3% of your grade.

PET ROCK/LAB PROJECT: At the end of the semester, you will be given an opportunity to showcase all that you have learned. Groups of 3-4 students will put together a presentation on the geologic history of a suite of rocks (around the pet rock you chose at the beginning of the semester). The lab project counts for 10% of your grade.

ONLINE QUIZZES/READING REFLECTIONS:

In preparation for “lecture” periods and the activities that we will do together, you are expected to do the assigned reading *in advance* of the class period. To encourage you to do this, I have set up some Desire2Learn quizzes and “reading reflections”. These are open book quizzes. You are also allowed to retake each quiz as many times as you like (preferably until you get 100%!) – ***RIGHT UP UNTIL CLASS STARTS THAT DAY.*** The quizzes/reading reflections will disappear once class begins at 11:30 am. They count for 5% of your grade.

IN-CLASS ASSIGNMENTS/HOMEWORK:

A lot of this course consists of in-class activities and/or homework assignments – things we start in class and may finish at home. All of the assignments should be placed in your binder. I will collect binders from time to time. Assignments (in and out of class) count for 15% of your grade.

FIELD TRIP:

In late September, we will be embarking on a field trip to Central Wisconsin. This day trip (expect to spend your entire Saturday from 8am-7pm) to the Wolf River Batholith and Rib Mountain is designed to let you see minerals in their natural habitats. The date for the trip this year is **September 24, 2011.** The field trip counts for 5% of your total grade.

A WORD ABOUT REPRESENTING YOUR WORK HONESTLY

Collaboration with your fellow students will be an essential part of this course. Collaboration is not the same as copying (plagiarism). I expect you to turn in your own work. Please note: *The Wisconsin Administrative Code states: “**Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors. Students who violate these standards must be confronted and must accept the consequences of their actions.**” (§ UWS 14.01)* *Plagiarism and other forms of academic misconduct are serious offenses with severe penalties. These penalties may include a failing grade on the assignment or in the course, disciplinary action by the Dean, even expulsion from the university. See the University of Wisconsin Oshkosh Student Discipline Code for definitions of academic misconduct and details about procedures, sanctions, and other relevant information. Specific questions about the provisions in the Student Discipline Code should be directed to the Dean of Students Office.*

If you do not understand the statement above or the definition of plagiarism, please make sure that you see me. By enrolling in this class (and actually in the University) you are agreeing to abide by this Code of Conduct - to treat others with the respect they deserve by giving credit where credit is due and to honestly represent your work. I will not hesitate to enforce the severest of penalties on students who violate this code. Every semester, I have to have the dreaded “plagiarism” conversation with at least one class. Let’s hope it isn’t this one!

LECTURE AND LAB SCHEDULE (TENTATIVE)

Wk	Date	Topic(s)	pages in Nesse	outside reading	D2L
Unit 1: Minerals and Physical Properties					
1	W 7-Sep-11	Intro & What is a mineral?			
	F 9-Sep-11	The Big 10 minerals/the Big 8 Elements	p. 45-46	<i>D: Ch. 1</i>	Y
2	M 12-Sep-11	Hand sample identification	Ch. 6	<i>D: Ch 2</i>	Y
	Lab 1	Mineral Properties/the Big 10	lab 1		
Unit 2: Crystal Chemistry and the Major Rock Forming Minerals					
	W 14-Sep-11	Review of Chemistry - the periodic table, atoms, ions, oxidation state, etc.	39-46	<i>K: 37-52 D: 47-68</i>	Y
	F 16-Sep-11	Crystal Chemistry - Chemical bonding	46-56	<i>K: 53-66 D: 147-168</i>	
3	M 19-Sep-11	Student presentations on bonding			RR
	Lab 2	Classifying and Identifying the Major minerals			
	W 21-Sep-11	Crystal structure - Paulings Rules	57-65	<i>K: 143-158 D: 225-242</i>	Y
	F 23-Sep-11	Paulings Rules in relation to minerals			
	S 24-Sep-11	Field Trip (8am – 6 pm)	see back of Handbook		
4	M 26-Sep-11	Mineral Chemistry - substitution/variation	65-73	<i>D: Ch. 10</i>	RR
	Lab 3	Practice with Mineral ID - the diagnostic properties			
Unit 3: Symmetry					
	W 28-Sep-11	2-D symmetry operations	6-14	<i>K: 111-118 D: 225-242</i>	
	F 30-Sep-11	2D symmetry exercise		<i>K: 143-158</i>	Y
5	M 3-Oct-11	6 crystal systems and 3D operations	14-19	<i>D: 242-249 K: 129-131</i>	Y
	Lab 4	Miller Indices			
	W 5-Oct-11	The importance of Miller Indices	19-38	<i>K: 131-142</i>	Y
	F 7-Oct-11	Naming planes and Lines (Miller Indices) (EXAM 1 begins)			RR
6	M 10-Oct-11	NO CLASS - GSA Annual Meeting			
	Lab exam	MINERAL ID EXAM			
	W 12-Oct-11	NO CLASS - GSA Annual Meeting			
Unit 4: Light in Minerals					
	F 14-Oct-11	Light (EXAM 1 due)	114-122	<i>K:288-290 D: 401-411</i>	Y
7	M 17-Oct-11	interference and anisotropy	122-129	<i>K: 294-298</i>	Y
	Lab 5	Light, Snell's Law and the petrographic microscope			
	W 19-Oct-11	light and interference	114-129	<i>K: 290-294 D: Ch. 5</i>	RR
Unit 5: The Indicatrix and Interference Figures					
	F 21-Oct-11	the optical indicatrix	130-139	<i>K:299, 304</i>	Y
8	M 24-Oct-11	Uniaxial and biaxial interference figures	139-151	<i>K:299, 304</i>	
	Lab 6	thin sections and more optical properties	136-140		
	W 26-Oct-11	Uniaxial interference figures exercise	139-143		Y
	F 28-Oct-11	Biaxial review and interference figures ex	143-151		Y

* available in the lab as photocopies.

K=Klein and Dutrow, 2007, Mineral Science. (also on reserve at the library)

D = Dyar, Gunter and Tasa, 2008, Mineralogy and Optical Mineralogy.

LECTURE AND LAB SCHEDULE (TENTATIVE)

Wk	Date	Topic(s)	pages in Nesse	outside reading	D2L
9	M 31-Oct-11	Biaxial TinkerToy exercise	130-151	K: 300-304	RR
	Lab 7	interference figures		D: 515-533	
Unit 6: Thermodynamic, Phases and Crystallization					
	W 2-Nov-11	Thermodynamics and the Phase Rule	handout	K: 249-265 D: 535-545	Y
	F 4-Nov-11	Crystallization, stability, nucleation	Chapter 5	K: 218-222, 245-249	RR
10	M 7-Nov-11	Phase diagrams (EXAM 2 begins)	Handout	K: 222-244, 266-285	Y
	Lab 8	Mineral ID in Rocks and Thin Sections			
Unit 7: Systematic Mineralogy					
	W 9-Nov-11	Systematic Mineralogy- Silicates	Handbook		Y
	F 11-Nov-11	Silicates (sheet silicate exercise)	Handbook		
11	M 14-Nov-11	Non-Silicates (EXAM 2 Due)	Handbook		
Unit 8: Igneous Mineral Associations					
	Lab 9	Igneous minerals	183-190		
	W 16-Nov-11	Igneous mineral associations	201-234, Handbook		Y
	F 18-Nov-11	Igneous Mineral Associations	261-268, 306-314		
Unit 9: Sedimentary Mineral Associations					
12	M 21-Nov-11	Sedimentary Mineral associations	252-260, 370-374		Y
	Lab 10	Sedimentary minerals	194-199		
	W 23-Nov-11	NO CLASS - THANKSGIVING HOLIDAY			
	F 25-Nov-11	NO CLASS - THANKSGIVING HOLIDAY			
13	M 28-Nov-11	Sedimentary Mineral Associations	326-346, 374-377		
Unit 10: Metamorphic Mineral Associations					
	Lab 11	Metamorphic minerals	190-194		
	W 30-Nov-11	Metamorphic Mineral associations	314-323		Y
	F 2-Dec-11	Metamorphic Mineral associations	291-300, Ch. 14		
Unit 11: Lab Project Work Time					
14	M 5-Dec-11	Lab project (no official class time)			
	Lab project	Work on Lab Project (no official lab)			
	W 7-Dec-11	Lab project (no official class time)			
	F 9-Dec-11	Lab projects due by 5 pm			
15	M 12-Dec-11	EXAM 3 BEGINS			
	NO LAB	Lab project session			
	W 14-Dec-11	work on exam (no class)			
	F 16-Dec-11	EXAM 3 AND LAB PROJECT WRITE-UPS DUE (12:30 PM)			

* available in the lab as photocopies.

K=Klein and Dutrow, 2007, Mineral Science. (also on reserve at the library)

D = Dyar, Gunter and Tasa, 2008, Mineralogy and Optical Mineralogy.

Understanding Grades

Table 1. Behavioral dimensions of grades and characteristics of outstanding and average students (modified from Williams, 1993).

Behavioral Dimension	“A” or Outstanding Student	“C” or Average Student
1. Attendance (commitment)	Nearly perfect attendance; rare excused absences except for other scheduled conflicts; make prior arrangements for missed content	Sometimes comes to class late; occasional absences from class are rarely excused; frequently puts other priorities ahead of course
2. Preparation	Well-prepared; readings and assignments completed before class with great attention to detail; rarely misses deadlines; retains information from the course and makes connections with past learning	Readings and assignments completed in a timely, but perfunctory manner with little attention to detail or further contemplation; work often appears to be “draft” quality
3. Curiosity	Has a motivating purpose; inquisitive; asks thoughtful questions and is an active participant in classroom discussions; makes the extra effort to learn more and connect with other aspects of education or life	Uninterested in subject material and class; participates in class and projects without enthusiasm; exhibits only modest interest in subject matter
4. Attitude (dedication)	Has a winning attitude and shows responsibility, motivation and determination to succeed; enjoys and values learning; listens to feedback and acts on it	Rarely does more than required; Seldom shows initiative; defensive about feedback and unwilling to accept responsibility; perceive themselves as victims
5. Talent (ability)	Possesses special talents such as exceptional intelligence, unusual creativity, or outstanding commitment that are evident to the instructor	Can have greatly varying natural talent; some students are quite talented, but lack organization or motivation; others are motivated, but lack special aptitude
6. Retention	Learns concepts rather than memorizes details so better able to connect past learning with present material	Tries to memorize facts at the last minute rather than learn concepts; makes few conscious efforts to connect new learning with past knowledge
7. Effort (time commitment)	Reads, studies, and thinks about course subject on a regular basis; begins assignments and projects well before deadlines; often willing to devote extra time and effort when needed; attention to detail; seeks out instructor outside of class	Does not develop a regular system for studying and doing assignments; frequently begins readings and assignments at the last minute; rarely willing to devote time necessary to develop deeper understanding
8. Communication Skills	Speaks confidently and writes well; presentations and documents are well-conceived, well-prepared, and informative	Presentations and written work lack organization and clarity; papers are generally draft quality requiring extensive re-writing to be effective; quality of content limited by poor communication skills
9. Results (performance)	Exams and papers are always of the highest quality (among the highest in a class); contributions in the classroom are significant and insightful; work demonstrates critical thinking	Products are mediocre or inconsistent in quality; writing and speaking indicates only a cursory understanding rather than a mastery of material