

Mineralogy (51-205)
Course Syllabus Fall 2021
MWF 11:30-12:30 *Harrington Room 217*
Lab Monday 1:50-5:10 *Harrington Room 216*

Prerequisite: GEO 102 or GEO 150 **Pre-/Co-requisite:** CHEM 105 or 109 *or instructor consent*

Instructor: Dr. Ben Hallett

Office: Harrington Hall 310

Email: hallettb@uwosh.edu

Phone: 920-424-0868

Office Hours: Thu 1:45–3:15pm, Fri 1–2:30pm, IN HARRINGTON 216
or by appointment

Description: Crystallography and crystal chemistry of the major groups of minerals. Mineral associations, alteration, and economic importance. Laboratory work consists of mineral identification using physical and chemical properties and mineral associations. Field trips may be taken to selected areas to illustrate principles taught in the course.

Prerequisites: Geology 102, 110 or 150; and Chemistry 105 (may be taken concurrently).

Texts: Nesse, W. D., 2017, *Introduction to Mineralogy*, 3rd Ed., Oxford University Press, New York, 495 p.

Wenner, J.M., 2019, *Mineralogy Handbook*, Oshkosh Document Services, Oshkosh, WI, 444 p.

Both will be available in the UWO Bookstore. An ebook is available for the lecture textbook (Nesse), though a physical copy is strongly recommended.

Course Objectives:

Welcome to Mineralogy! The word mineralogy literally means “the study (*or learning or account*) of minerals”. Minerals are the **basic building blocks of all geologic materials**; therefore, mineralogy and optical mineralogy provide the foundation for your future as a geologist. Every sub-discipline of the geosciences relies on identification of minerals (and their chemical components) using physical, chemical and optical properties. Once you can observe, identify and categorize minerals, you can begin to analyze and assess Earth processes and to interpret and infer geologic histories from the constituents of rocks and other geologic materials.

Mineralogy (the class) is also the first in the core courses for all of the Geology majors and minors. This means you are now part of the core of the Geology Department – *welcome to the family!* As a part of the Geology Department, you should consider engaging with the Geology Club and the activities they do. With the club, you can do things like go on field trips, see interesting and engaging speakers, go to the Department banquet for free!

Sometimes, Mineralogy might seem like a trial by fire – it involves significant commitment to the subject, time spent in the lab and immersed in everything mineral, and sometimes it involves struggling with the topic presented. Always remember, learning really only happens when you struggle a bit – you will be amazed at how much you learn by the end of this course, and how you’ve developed your work ethic and joined a community.

I have high expectations of mineralogy students – you are expected to spend a significant amount of time ***IN the labs in Harrington Hall*** examining mineral and rock specimens

(“homework” in this class means “lab work” most of the time). This includes a significant amount of time *outside* of the scheduled lab and class periods working on lab assignments and learning minerals and their formulas. Room 216 (and generally Harrington Hall) houses many of the tools that you will need to succeed in Mineralogy, including your collaborators, specimens for study, microscopes and a library. Although my expectations may seem high, students always rise to the challenge and succeed. Please ask if you are unsure what the expectations are. I am available for help should you need it. I WANT you to succeed.

That said, your best chance to succeed involves healthy learning habits. I strongly recommend making a schedule and planning to dedicate **significant time to studying and working on assignments in the lab space provided for you**. This means including time in your schedule to study in the low-distraction environment of the Mineralogy lab outside of lab time.

By the end of this course you should be able to:

1. Constructively collaborate with classmates on multiple learning activities and produce both group and individual products based on those learning activities.
2. Describe physical properties of 37 minerals in hand specimen and identify them in hand sample without the aid of determinative tables (Mineral ID exam is Oct 24).
3. Describe physical and optical properties of approximately 30 minerals to aid in the identification of rock specimens and minerals in thin section.
4. Identify unknown mineral species with the aid of determinative tables.
5. Classify minerals based on chemistry, crystallography (crystal structure), and mineral associations (rock type).
6. Interpret mineralogy of rocks to reconstruct their geologic histories.
7. Produce a group presentation (oral and written) about a suite of rocks.

Nuts and Bolts of the Class:

Required class meeting times are **Mondays, Wednesdays and Fridays from 11:30-12:30 in H217**. Required labs meet at **1:50 pm on Monday** in H216. Please arrive *on time*. Plan to work through the ***entire designated lab period***, which is the best time to address questions about the lab and to collaborate with your classmates. I am reasonable about life conflicts, but excused absence or make up work will only be granted with prior approval—please communicate!

The mandatory field trip for this class will be on Saturday October 15. *Please mark it in your calendar ASAP so that you can be prepared for it.* This trip will last all day (8am to 5 or 6 pm), and we will make a lunch stop where you can buy lunch (or you may bring a bag lunch). We will be back in Oshkosh in time for dinner.

You must bring with you to lecture and lab:

- **Textbook:** Nesse, W. D., 2017, *Introduction to Mineralogy* (There are also some supplemental readings that will be provided online).
- **Mineralogy Handbook (2022):** This is a lab manual and course guide. **You should bring it to class EVERY DAY.** You must bind this in a 3-ring binder.

- **Notebook and folder or three ring binder** for all of your assignments and notes you take in class (loose-leaf paper can be useful for this). I will check these binders from time to time.
- **Access to Canvas:** Quizzes and online readings can be found on the Canvas site.
- **Triplet 10x Hand lens:** This is one of the most important tools for mineral ID and you will use it throughout your academic career. If you already have a Bausch & Lomb Hastings Triplet you may use it. You can purchase an appropriate 10x Triplet hand lens from me which you will use throughout your geology career. Bring it to *EVERY CLASS & LAB PERIOD!*
- **Mineral identification tools:** I will provide you with a kit of tools that you can use to identify minerals – **a penny, a streak plate and a steel nail.** A **pocketknife** (*blade no longer than 4"*) can also be quite useful. I will not provide you with this tool, but you can feel free to bring one to use to identify minerals (replacing the steel nail).

Information About Grading and Grade Breakdown:

3 EXAMS40%

All three scheduled lecture exams will be open-book, take-home exams. 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 about honestly representing your own work for more information.*

MINERAL ID EXAM10%

The MINERAL ID EXAM is an in-class EXAM. On October 26, you will be asked to identify 50 samples of the 37 minerals you will learn to identify in the preceding labs (without the use of determinative tables). The list of minerals you will be expected to identify without the aid of determinative tables are listed in your course handbook (in Appendix A).

LABS (11 Total).....22%

Each lab can be found in the *Mineralogy Handbook*, to be purchased at the bookstore. The 11 labs are worth 100 points each. All assignments are due at the beginning of the following lab period - except for the *Sedimentary Minerals Lab* just before Thanksgiving. (generally 1 week after they are assigned). The lab period for this class is **3.33 hours** – please do not expect to be excused early.

LAB PROJECT6%

At the end of the semester, you will be given an opportunity to synthesize what you have learned. Groups of 3 students will put together a presentation on the geologic significance of a particular mineral (or group of minerals), and examples of its occurrence. There are three parts to the lab project – Lab notes including written synopsis (30%), poster (40%), and brief presentation (30%).

MINERAL ID AND CHEMICAL FORMULA QUIZZES (~10 TOTAL)5%

To prepare for the Mineral ID exam, we will practice each week. We will have a closed- book mineral ID quiz at the beginning of each lab, and announced chemical formula quizzes through the semester (I'll tell you which ones). These consist of identification of minerals using every day tools (hand lenses, streak plates, magnets, etc.). Any of the 37 minerals may appear on the ID quizzes.

IN-CLASS ASSIGNMENTS/PARTICIPATION5%

A lot of this course consists of in-class activities – exercises that we complete during the lecture period (and sometimes finish at home). I may collect in-class assignments that we complete in class from time to time. Be prepared to provide me with the individual work you completed in class when I ask for it.

ONLINE QUIZZES (CANVAS)..... 2%

In preparation for each topic 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, Canvas quizzes are based on the reading for the next lecture period. 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*. Access to quizzes will end at 11:30 am – when class starts. The due dates for quizzes (Canvas Q#) will be posted on Canvas.

HOMEWORK 5 %

There are ten homework assignments listed in the syllabus (worth 20 points each). Generally, these consist of preparation for the work we will do in class. I will make you aware of the homework in plenty of time to complete it.

FIELD TRIP.....5%

On Saturday, October 15, 2022, we will take a field trip to Central Wisconsin. This trip (from 8am-6pm) to the Wolf River Batholith and Rib Mountain is designed to let you see minerals in their natural habitats – rocks! The trip is mandatory.

On page 6 of your handbook is a chart designed to help you comprehend what a grade actually means in terms of work (other than a number, what constitutes achieving an A vs. a C?).

Grade scale: 93% and up = A; 90–92 = A-; 87–89 = B+; 83–86 = B; 80–82 = B-; 77–79 = C+; 73–76 = C; 69–72 = C-; 66–68 = D+; 63–65 = D; 60–62 = D-; <60% = F
Graduate (523) grade scale: 93% and up = A; 90–92 = A-; 87–89 = B+; 83–86 = B; 80–82 = B-; 77–79 = C+; 73–76 = C; 69–72 = C-; <70% = F

Collaboration – An Integral Part of this Course:

The design of this course is to 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! Each portion of this course builds on previous knowledge. Therefore, you are expected *to retain and apply the information that you have learned throughout this class* and beyond into other geology courses. Mineralogical information is the foundation of your geologic education at UWO, you will use much of what you learn this semester for the rest of your life as a geoscientist!!

There is significant evidence that students retain much more when engaged with and teaching their peers (e.g., McLeish, 1968). And, active learning is most effective when students collaborate (e.g., Johnson et al., 1991; Prince, 2004). Therefore, *much of your time in the classroom will be spent on collaborative activities* designed to help you learn the material – teaching each other is one of the best ways to retain information! Your grasp of concepts covered in team activities will be assessed individually on exams and quizzes. This means that you are individually responsible for making sure you have a good understanding of these concepts as well as helping your colleagues! I also usually collect assignments from each individual, so you will be graded on your individual work as well as your interaction with the team.

Academic Integrity:

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.” (§ UWS 14.01) **Plagiarism and other forms of academic misconduct** are serious offenses with penalties listed in the student discipline code: <https://uwosh.edu/deanofstudents/student-conduct/academic-misconduct/>. If you do not understand this statement, please see me as soon as possible.

Special Accommodations: Reasonable accommodations will be made for students with disabilities. Please contact the Accessibility Center (424-3100 (voice) or 424-1319 (TTY)) or visit their web site at <http://www.uwosh.edu/deanofstudents/Accessibility-Center> for the University’s accommodation request form and documentation requirements. Information related to an individual’s accommodation request will be kept confidential.

My Expectations and Your Responsibilities:

IN-CLASS WORK: The large amount of collaborative time means that *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.

ATTENDANCE: Attendance is required. Should you need to miss a class, a valid excuse is required, and *it is your responsibility to find out what you need to do to catch up* before the next class session so that you don’t hold yourself or your group members back. Please let me know as soon as possible if you will be missing a class.

DEADLINES: Another of your responsibilities is to *complete assignments ON TIME*. Assignments are to be completed before we start class or lab on the due date listed in the syllabus (and on Canvas). Deadlines in this class are **not** flexible for two reasons: 1) material is cumulative throughout the semester; 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 can’t return assignments if students haven’t completed them.

ABSENCE/LATE WORK: *As with any rule, there are always exceptions. In the back of your Handbook, you will find two “Mineralogy Bucks” for extensions on two assignments for any reason – sickness, a funeral, etc. These are good for a 48-hour extension on (almost) any assignment (certain conditions apply). **Just let me know at the time the assignment is due (or before) that you will be using your “Mineralogy Buck” and I won’t expect your assignment for another 2 days. Remember, you only get 2 extensions, so use them wisely. The Mineralogy Bucks are not valid toward your lab project at the end of the semester.***

TAKING NOTES IN CLASS: From time to time, I will present some information in the form of lectures. During these times, you should engage with this material by *taking notes by hand in pencil or pen* on a piece of paper. I encourage you to do this because there is significant evidence that the action of writing (by hand) notes helps with recall (e.g., Smoker et al., 2009).

What you can expect from me:

I want all students to feel welcome and included in the course whoever you are or whatever background you have. I try my hardest to be available when you might need help. I want students to visit and ask questions in lab, at my office hours, before/after class, and via email. My goals are the following: to be enthusiastic about course material, to present material in an organized way, to provide resources you need to be successful, to respond quickly, to set a high standard for the course and help you meet those standards, and to be fair and respectful.

Classroom Considerations for Fall 2022:

- All students are required to follow Campus health regulations and adhere to any additional expectations communicated by the instructor or posted in the classroom. These apply during class/lab meetings as well as all other times in the laboratory.
- Disinfecting Workspaces in Classroom and Lab: Students may disinfect their workspace prior to the start of each class using the wipes provided. Due to the sharing of lab materials and samples students are encouraged to regularly sanitize hands and disinfect workspaces.
- *Eating is prohibited in classrooms and labs during class and lab periods.*

Regarding Diversity, Equity & Inclusion: Diversity drives innovation, creativity, and progress. At the University of Wisconsin Oshkosh, the culture, identities, life experiences, unique abilities, and talents of every individual contribute to the foundation of our success. Creating and maintaining an inclusive and equitable environment is of paramount importance to us. This pursuit prepares all of us to be global citizens who will contribute to the betterment of the world. We are committed to a university culture that provides everyone with the opportunity to thrive.

Disclosure Statement: Students are advised to see the following URL for disclosures about essential consumer protection items required by the Students Right to Know Act of 1990:
<https://uwosh.edu/financialaid/consumer-information/>

Mineralogy Tentative Course Schedule:

Week	Date	Topic	Reading	Notes
Wk 1	9/5	Introductions and Definitions	Nesse § 1	
No Lab				
Wk 2	9/12	Physical Properties of Minerals; Mineral Chemistry and Bonding	Nesse § 3, § 6	
Lab 1	9/12	Physical Properties of Minerals	Handbook	HW 1 due at Lab
Wk 3	9/19	Crystal Structure and Pauling's Rules	Nesse § 4	
Lab 2	9/19	Mineral Identification	Handbook	
Wk 4	9/26	Chemical Variation and Mineral Formulas; Intro to Symmetry	Nesse § 4, § 2	
Lab 3	9/26	Advanced Mineral Identification	Handbook	
Wk 5	10/3	Crystal Systems; Crystal Faces and Miller Indices	Nesse § 2	Exam 1 begins
Lab 4	10/3	Identifying Minerals in Rocks	Handbook	
Wk 6	10/10	Miller Indices and Optics	Handbook	Exam 1 Due
Lab 5	10/10	Miller Indices and ID practice		
Required Field trip Saturday Oct 15 8am-5pm				
Wk 7	10/17	Light, Isotropy, Interference	Nesse § 7	
Lab 6	10/17	Using a Petrographic Microscope	Handbook	
Wk 8	10/24	The Optical Indicatrix	Nesse § 7	
No Lab	10/24	Mineral Exam		Prepare for 50 minerals
Wk 9	10/31	Interpreting Interference Figures	Nesse § 7	Exam 2 begins Wed
Lab 7	10/31	Interference Figures	Handbook	
Wk 10	11/7	Mineral formation and stability; Rock Forming Minerals	Nesse § 7, § 11	Exam 2 Due Wed
Lab 8	11/7	Rocks in Thin Section	Handbook	
Wk 11	11/14	Mineral Formation from melt; Mineral Growth	Nesse § 5, § 11	
Lab 9	11/14	Minerals in Igneous Rocks	Handbook	
Wk 12	11/21	Sedimentary Mineral Formation	Nesse § 13, § 17	
Lab 10	11/21	Minerals in Sedimentary Hand Samples and Thin Section	Handbook	Break – No class 11/24, 11/26
Wk 13	11/28	Metamorphic Minerals and Stability	Nesse § 11; K&P §14(cnv)	Exam 3 begins Fri
Lab 11	11/28	Metamorphic Minerals in Hand Sample and Thin Section	Handbook	
Wk 14	12/5	Lab Project		Exam 3 due Fri
	12/5	Work on Lab Project		
Wk 15	12/12	Lab Project		Poster due Tue
	12/14	Lab Project Poster Session		

Important dates: 9/7/22 class begins; 9/13/22 last day to add without instructor's signature; 10/4/22 last day to add with instructor's signature; 10/4/22–10/10/22 Early Alert; 10/21/22 last day to drop without Late Drop Request Form or withdrawal; 11/23/22–11/27/22 Thanksgiving Break; 12/16/22 Classes end.