

**Instructor:**

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Place and Times:

Van Wickle, Room 15
Lecture: MWF, 9:00-9:50
Lab: M, 1:10-4:00
Office Hours: T 11-12 and 1-2; F 3-4:30
Or by appointment or drop-in

Course Objectives

“To see a World in a Grain of Sand” is the opening line of *Auguries of Innocence* by William Blake. It is also the opening line of Geology 200. To see our world in a grain of sand, we must change our perspective. We must transition our eyes and our minds from a “macro” view of the world to its microscopic and atomic underpinnings. In this course, you will answer questions like: What is a mineral? How are atoms arranged in minerals, and how do we describe and categorize these atomic arrangements? What laws of nature govern the structure and composition of a mineral? How are minerals identified and what underlying properties allow for that identification? Why are specific minerals found in some geologic settings and not others? How are minerals used as indicators of specific geologic conditions or resources? What do minerals tell us about rocks? In answering these questions, you will gain familiarity with various tools, including petrographic microscopes, a scanning electron microscope (SEM), and powder X-ray diffraction (XRD). The answers to these questions will both broaden and deepen your understanding and appreciation of the natural world.

Learning Outcomes

- Identify basic minerals and understand their atomic structure and compositions
- Describe and explain geochemical relationship to mineral occurrences
- Acquire, evaluate and interpret sound scientific data and about the Earth
- Create, interpret, and evaluate descriptions and representations of scientific data including graphs, diagrams, tables, and maps
- Employ the fundamental elements of the scientific method in the natural world

Textbooks: *Introduction to Mineralogy* by Nesse is required for this class. I will use the 2th edition (2012, ISBN:978-0-19-982738-1) when I assign readings and make references to the text in class. If you decide to use a different edition of the book, please check in frequently with your classmates to ensure you are covering the assigned material. We will also read *Barren Lands: An epic search for diamonds in the North American Arctic* by Krajick (2001, ISBN: 0-71674026-5) as a companion to your semester long sand project.

Teaching Philosophy: I am a strong proponent of “active learning,” and “challenge-based learning.” Things “stick” best when you learn by doing. A great deal of our shared class time will be dedicated to hands-on activities, experiments, problem-identifying and problem-solving exercises, peer-instruction, peer grading, and discussions (and more!). There will be frequent opportunities to identify subtopics and examples that are relevant to your own personal interests. This approach to teaching and learning has huge benefits, but it requires a great deal of participation, cooperation and enthusiasm on your part.

Attendance: Come to class. Come to lab. Be punctual. I will happily accept dean-approved absences, or dean-ratified notes from the Baily Health Center. Otherwise, you must be in class and lab to earn points towards your final grade.

Technology in the classroom: It’s not the Stone Age anymore. We live in an amazing technological era, and we will make use of many electronic resources (e.g., Google Earth, Excel, PowerPoint, Prezi, Moodle, VESTA, etc.) during our shared lecture and lab time. However, there is a time and a place for everything. As a general rule, please consider our classroom to be a *screen free zone*. I will be very clear about times when laptops, tablets, and phones (or similar) may be used in the classroom. Otherwise, come to class ready to participate in discussions and activities and critical thinking exercises without the crutch or distraction of a tool with a power button.

Academic Accommodation: I am available to discuss appropriate accommodations that you may require to be successful in this course. Contact the Academic Resource Hub (<https://hub.lafayette.edu/>) and begin creating an action plan as soon as possible.

Moodle: We will use Moodle frequently, for daily reading assignments, resource distribution, discussion forums, surveys and polls, assignment submissions, grade reporting, etc. Check often for updates!

Moodle Disclaimer: Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates federal privacy laws. Courses using Moodle will make student information visible to other students in this class. This information is protected by these federal privacy laws and must not be shared with anyone outside the class.

Academic Honesty: Integrity is of paramount importance and I hold it in the highest regard. The work you submit for assessment must be of your own original thought and creation. Otherwise, give credit where credit is due (citing published work or acknowledging your peers for their contributions). If you have questions about academic honesty—especially for partner or group work—please ask! Any perceived breach of academic integrity will be reported to the chair of the Geology and Environmental Geoscience Department and to the Dean of Students. Consult the Lafayette College Student Handbook for further information.

Course schedule: This schedule, like our dynamic planet, is subject to change. Check Moodle often.

Week	Theme	Important Dates
26 August	Introduction to minerals	
02 September	Elements, atoms, ions, bonding (ch. 3)	
09 September	Crystal structure, coordination, Pauling's rules (ch. 4)	
16 September	Symmetry, crystal systems + forms (ch. 2)	
23 September	Thermodynamics of crystal growth (ch. 5)	
30 September	Review and transition	Fri. 04 Oct: Exam 1
07 October	Optical Mineralogy (ch. 7)	
14 October	Silicates vs. non-silicates	Fall Break (Mon., Tues)
21 October	An introduction to silicates, orthosilicates (ch. 11, 16)	
28 October	Cyclo- and di- silicates (ch. 15)	
04 November	Chain silicates (ch. 14)	
11 November	Sheet silicates (ch. 13)	Fri. 15 Nov: Exam 2
18 November	Framework silicates (ch. 12)	
25 November	Thanksgiving and Transition Week	Thanksgiving Break (WF)
02 December	Mineral assemblages, final reflections, and culmination of your semester long Sand Project.	Mon. 02 Dec. Poster due Fri. 06 Dec. Presentation Fri. 06 Dec. Report Due
The Registrar will announce the time and date of the <i>final exam</i> at a later date.		

Work Submission Deadlines:

- Typical assignments in a typical week are due by *Sunday at midnight*. This includes:
 - Quiz question contributions (QQCs) submitted via Moodle forum
 - Physical lab documents and self-assess rubrics submitted to Dr. Carley's office
 - Digital lab materials via Moodle submission portal
 - Sand project checkpoints (relevant weeks) via Moodle submission portal
 - Extra credit seminar reflections via Moodle ~one week following the relevant event
- Early work incentive:
 - Earn 5 bonus points towards any lab submitted on Friday during business hours
- Late work will be accepted until graded work is returned to your classmates: 5% penalty if late on deadline day, plus an additional 20% penalty after that. Exams cannot be rescheduled.

Protected Privacy: You will be assigned a random 4 digit ID number to use on all of your peer graded work (weekly quizzes, sand project checkpoints). Respect the anonymity of the number.

Work Return: Graded assignments will be placed in a folder, labeled with your anonymous ID number, outside Dr. Carley's office. Graded exams may be viewed and discussed in office hours.

Grade Communication: You are responsible for keeping track of your grades throughout the semester. You may inquire about your grade in office hours. Grades are not negotiable—take advantage of extra credit opportunities!

Grading policy:

Exceeds expectations		Good, high-quality work			Sufficient; baseline expectations met			Room for improvement		
A	A-	B+	B	B-	C+	C	C-	D+	D	D-
94%	90%	87%	84%	80%	77%	74%	70%	67%	64%	60%
The provided numbers indicate the minimum score that must be earned for each corresponding letter grade. Grades are non-negotiable. Take advantage of extra credit!										

Grade Breakdown:

Category	Brief Description	%
Quizzes and QOCs	We will begin class each Monday with a short, peer-graded, quiz. Quiz questions will cover the previous week's lecture and the new week's reading assignment. Each week you will develop three quiz question contributions (QOCs) and submit them to Moodle before Sunday at midnight. One must relate to material already discussed in class, the others to the new reading for the week. If you do not submit a thoughtful QOC by the deadline, the highest quiz grade you can earn is 75%. All lecture quizzes are weighted equally; mineral ID quizzes count for two lecture quizzes.	15
Exam 1	This exam will cover material from lecture, lab, and your sand project (including Barren Lands reading). All concepts discussed through Mon. Oct. 1 (inclusive) are fair game. You will ID samples, draw sketches and labels, and write short responses.	10
Exam 2	This exam will cover material from lecture, lab, and your sand project (including Barren Lands reading). All concepts discussed through Monday, Nov. 12 (inclusive) are fair game. You will ID samples, draw sketches and labels, and write short responses. ~30% major concepts from Exam 1, ~70% new material since Exam 1.	10
Final Exam	Sample ID, short answers, sketches, labeling. Material from lecture, lab, and your sand project (including Barren Lands). All concepts discussed this semester are fair game. ~50% major concepts from Exams 1 and 2, ~50% new material since Exam 2.	10
Labs	Each lab is weighted equally unless specifically indicated otherwise on a particular assignment. Tasks related to your sand project are not factored into your lab grade. Physical submissions are due to Dr. Carley's office and electronic submissions will be collected via Moodle. The standard weekly deadline is Sunday at midnight; you will be awarded 5 bonus points if you submit your lab on Friday during business hours.	20
Sand Project: Checkpoints	You will have writing checkpoints throughout the semester in which you will submit drafts of your Geologic Background, Methods, and Results sections. Your work will undergo peer review, to improve your report before final submission.	5
Sand Project: Peer Support	There will be several times throughout the semester where your collaborative participation is necessary for your peers to have a meaningful, productive, experience. These include (1) assisting a partner with sample processing or analytical tasks; (2) thoughtfully completing peer reviews for writing checkpoints; and (3) preparing for and participating in Barren Lands discussions.	10
Sand Project: Poster	You will submit your poster for printing on the last Monday of the semester and present it to Dr. Carley and your classmates on the final Friday. Poster content, presentation quality, and assessment of your peer's work will determine your grade.	5
Sand Project: Final Report	You will submit your final report on the last Friday of the semester. More than half of your report will be a compilation of work submitted as checkpoints throughout the semester (Geologic Background, Methods, Results). Respond to feedback you received from peer review to improve your final product. Your Discussion and Conclusion will not be (officially) peer reviewed before your final submission.	15

Extra Credit: You may earn up to 5% extra credit towards your final grade. You can earn 0.25% toward your final grade by attending Brown Bag Seminars, signing up on the attendance sheet, and listening attentively. A short write up (2 pages, 1 inch margins, 1.5 spacing, size 12 font) can be turned in for 1% extra credit towards your final grade. The write up must contain: (1) a summary of the lecture; (2) an overview of issues you found particularly interesting; and (3) questions you have related to the content of the lecture. These will be accepted via Moodle, and are due by Sunday at midnight, approximately one week following the event in question. For dates and topics, visit: <https://geology.lafayette.edu/seminar-series/>.