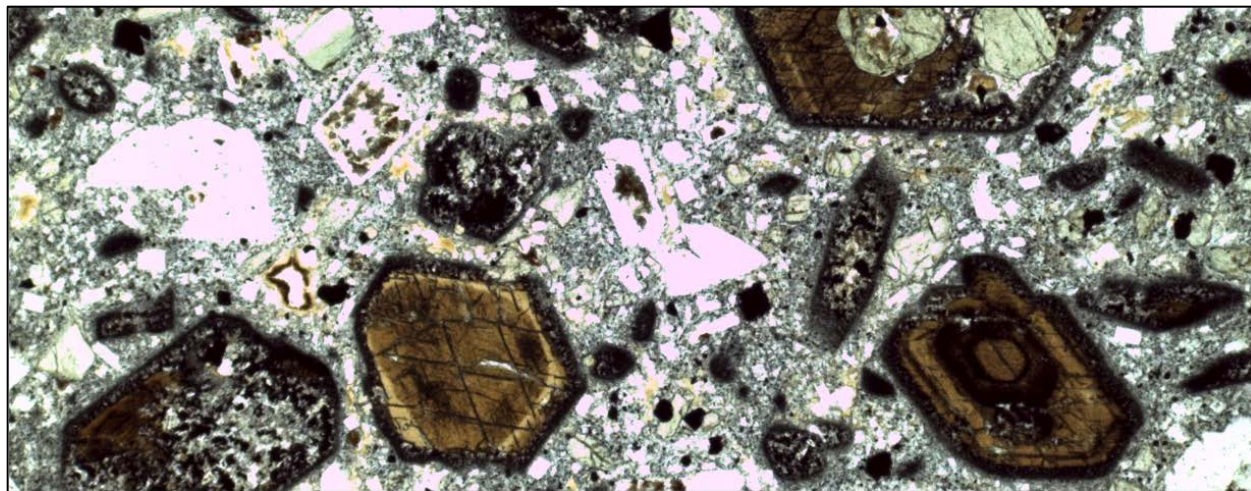


**Instructor:**

Dr. Tamara Carley
Email: carleyt@lafayette.edu
Classroom: Van Wickle 15
Office: Van Wickle 101c
Research Lab: Van Wickle 1c

Days and Times:

Lecture: MWF 10:35-11:25 am
Lab: M 1:15-4:00 pm
Office-hours: WF 11:30-12:30 pm
& 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 transition our eyes and our minds from a “macro” view of the world to understand 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 and geologic processes? In answering these questions, you will gain familiarity with various tools, including petrographic microscopes, a scanning electron microscope (SEM), a powder X-ray diffractometer (XRD), and a portable X-ray fluorescence spectrometer (pXRF). 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.

Required textbook and other resources

A physical copy of *Introduction to Mineralogy* by Nesse (any edition, but I will use the 4th), is required for this class. Plan to bring this textbook to lab. We will also make frequent use of the free e-versions of *Mineralogy* (2022) by Dexter Perkins and *Introduction to Petrology* (2023) by Johnson and Liu. Both are linked on Moodle.

Talkin' rocks: I'm here for you! I'm very happy to discuss the course, assignments, your experience, and this dynamic planet of ours. My office hours are listed at the top of this syllabus, and I'm also happy to see you by appointment or drop-in (but let's talk about the "law of angles"). Please note that I will often hold my "office" hours in my research lab. I limit my time on email outside of standard business hours. Plan accordingly!

A typical day / the way I teach: I am a strong proponent of active learning and challenge-based learning. The majority of our shared class time will be dedicated to hands-on investigations, problem-solving exercises, demonstrations, discussions, and more. You will learn a great deal about geology; you will also improve your scientific literacy, critical thinking, and communication skills. This approach to teaching and learning has huge benefits, but it requires a great deal of participation, cooperation, engagement, and enthusiasm on your part.

Attendance: If you are healthy and it is safe for you to participate in face-to-face opportunities, I expect you to come to class and lab and participate fully. Be punctual. If you are unwell and your attendance will jeopardize the health and wellbeing of yourself and your community, I expect you to be responsible and stay at home. If you find that you need to miss excessive classes for health and wellness reasons, we will work together with your class Dean to develop a strategy for success. Your attendance and participation will influence your score in "The Daily."

Technology in the classroom: Please develop the habit of bringing a laptop and cellphone to lab (let me know ASAP if this poses a problem—we'll figure it out). However, please consider our classroom to be a *laptop and phone free space* during lecture (the use of tablets for note taking is acceptable). I will be very clear about times when laptops and phones may be used. Failure to cooperate will negatively impact my ability to teach and your ability to actively engage and participate. Abuse of screens will influence your score in "The Daily."

Academic Accommodation: In compliance with Lafayette College policy and equal access laws, I am available to discuss appropriate academic accommodations that you may require as a student with a disability. Requests for academic accommodations need to be made during the first two weeks of the semester, except for unusual circumstances, so arrangements can be made. Students must register with the Office of the Dean of Advising and Co-Curricular Programs for disability verification and for determination of reasonable academic accommodations.

Moodle: We will use Moodle frequently—for communication, daily reading assignments, resource distribution, and assignment submissions. Please familiarize yourself with Moodle and develop a habit of checking it frequently. Please let me know if you have any questions or concerns.

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. 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.

Federal Credit Hour Compliance: The work in this course is in full compliance with the federal definition of a four credit hour course. See the Registrar's Office web site for the full policy and practice statement.

Academic Honesty: Integrity is of paramount importance and I hold it in the highest regard. The official Lafayette policy is: *"To maintain the scholarly standards of the College and, equally important, the personal ethical standards of our students, it is essential that written assignments be a student's own work, just as is expected in examinations and class participation. A student who commits academic dishonesty is subject to a range of penalties, including suspension or expulsion. Finally, the underlying principle is one of intellectual honesty. If a person is to have self-respect and the respect of others, all work must be his/her own."* Any perceived breach of integrity will be reported to the head of the Department and to your class Dean.

AI Policy: Students are not allowed to use advanced automated tools (artificial intelligence or machine learning tools such as ChatGPT or Dall-E 2) on assignments in this course. Each student is expected to complete each assignment without substantive assistance from others, including automated tools. Any exceptions to this rule will be explicitly stated in class and in assignment instructions.

Grade breakdown

Category	Brief Description	%
The Daily	Your engagement in and success with the day-to-day experiences of Geology 200 will be calculated using a combination of response notecards (typically 4 points), activity sheets (typically 8 points), and occasional quizzes (typically 12 points, announced in advance). Your lowest scores, up to 12 possible points (e.g., 3 response notecards, one notecard and one activity, or one quiz) will be factored out of your final grade at the end of the semester. Attendance, punctuality, and inappropriate use of screens (etc.) during class may influence this grade.	15
The Box	On the first day of class, you will be introduced to a set of 50 minerals. At the end of the semester, you should be able to confidently characterize, classify, and identify them using physical and chemical properties. You will chart your progress in an ever-growing spreadsheet, to be submitted on the last day of class.	15
Labs	Each lab is weighted equally unless indicated otherwise. The standard deadline is Sunday at midnight, but you will be awarded a 5% bonus if you submit your lab on Friday before 5 pm (exceptions may apply). Some lab time (e.g., Week 1) will be dedicated to progress on "The Box" or your mineral characterization term project and will not be associated with graded lab work.	15
Mineral Characterization Project	This semester, you will learn increasingly sophisticated ways to characterize minerals (physical properties → crystal structure → symmetry → optical properties → XRD → XRF → SEM). As you learn new skills, you will apply them to a mineral extracted from an Icelandic rock. You will present your characterization in a poster due the last week of class.	15
Exam 1	This 50-minute exam will cover material from both lecture and lab. The exam may include sample characterization and ID, labeling and interpreting graphs and diagrams, and writing short responses.	15
Exam 2	This 50-minute exam will follow the same format as Exam 1. ~ 25% of your exam grade will relate to major concepts from Exam 1, ~75% to new material.	15
Final Exam	This 150 minute exam will cover material from lecture and lab and your final project. All course content is relevant and may be encountered on this exam.	10

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

Week	Theme	Important Dates
25 August	Introduction to minerals and their physical properties	Aug. 29: Mineral Property Quiz (F)
01 September	Elements, atoms, ions, bonding	
08 September	Crystal structures and Pauling's rules	
15 September	Crystal symmetry	
22 September	XRD, XRF, mineral classification	
29 September	Optical mineralogy	
06 October	Microanalysis using SEM	Oct. 6: Exam 1 (M) Oct. 10: No class (F)
13 October	Mineral groups, mineral formulas, and non-silicates	Oct. 13: No class or lab (M)
20 October	Orthosilicates	
27 October	Chain silicates	
03 November	Sheet silicates	
10 November	Framework silicates	
17 November	Review and transition	Nov. 21: Exam 2 (F)
24 November	Thanksgiving	No class or lab this week
01 December	Wrap up	Dec. 3: Poster due (T) Dec. 5: Poster Presentation (F) Dec. 5: "The Box" due (F) Dec. 5: Extra credit write-ups due (F)
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:
 - Physical lab documents and self-assessment rubrics submitted to Dr. Carley's office;
 - Digital lab materials (typically PDFs) turned in via Moodle submission portal;
- Early work incentive: Earn a 5% bonus on labs submitted Friday by 5 pm (exceptions may apply).
- Late work will be accepted until graded work is returned to your classmates: 5% penalty if late on deadline day, plus an additional 25% penalty after that.
- Exams cannot be rescheduled.

Work Return:

You will be assigned a random 4 digit ID number to use on all of your notecards, self-assessment rubrics, etc. Respect the anonymity of the number. Graded work and exam scores will be placed in a folder, labeled with an anonymous ID #, outside Dr. Carley's office for you to pick up at your convenience. You can view and discuss your graded Exams 1 and 2 in a one-on-one meeting with Dr. Carley. In these meeting, you may earn back partial credit (up to 30% of points missed) by demonstrating improved understanding on previously-missed material. Your Exam 1 meeting must take place before Exam 2; your Exam 2 meeting must happen before the last class of the semester.

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 non-negotiable.

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!										

Extra Credit:

There are several regularly-available opportunities for extra credit in this class, such as early incentive bonuses for lab submissions and point earn-back meetings following exams 1 and 2. Separate from these opportunities, you may earn up to 5% extra credit towards your final grade. You can earn 0.25% toward your final grade by attending Geology Seminars, signing the attendance sheet, and listening attentively. A short write up (2 pages, 1 inch margins, 1.5 spacing, size 11 font) can be turned in for up to 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 interesting; and (3) questions you have related to the content of the lecture. These will be accepted via a Moodle submission portal, and are ***due no later than midnight on the last Friday of classes*** (before the final exam period begins). You may also petition to receive extra credit for attending other relevant campus or community events and submitting a write-up that follows the same guidelines listed above. Additional extra credit opportunities, including those associated with optional field trips, will be announced at a later date.