Mineralogy (GEOSC-220) Fall 2024 Syllabus

Instructor: Shreya Kanakiya Office: Taylor Science Center Room 1022

Email: skanakiy@hamilton.edu

Class Schedule: Mon-Wed-Fri 11.00-11.50 AM | **Lab Schedule:** Tue 1.00-4.00 PM | One day field-trip: 6th Oct (Weather-permitting) **Class/Lab Location:** Classes will be held at Taylor Science Center Room 1033. Labs will be conducted in rooms 1033, 1018, and 3019 in the Taylor Science Center based on the contents that week, location details will be confirmed on the Monday before each lab.

Welcome to Mineralogy!

The Earth is composed of rocks - which are aggregates of minerals. If we are to understand the Earth's properties, behavior, and influence on modern society, we must understand minerals and rocks. In this course, we will explore what minerals are, how they form, the fundamentals of identifying minerals using basic and advanced analytical methods, minerals and rocks found in various parts of the Earth from core to crust. Through the course, we will also explore several applications of mineralogy in active research areas like geological hazards, green transition, and planetary exploration.

Educational Goals and Learning Outcomes

Hamilton College challenges its students to foster the fulfillment of the eight educational goals throughout their time at the College. Below is a description of how the expected learning outcomes of this course promote several of these goals:

- Intellectual Curiosity and Flexibility Students will examine facts, phenomena, and issues about minerals in depth to gain a better understanding of the Earth its properties, behavior, and influence on modern society.
- Aesthetic Discernment Students will learn to evaluate and describe aesthetic features of various minerals and classify them.
- Analytic Discernment Students will learn basic concepts in the scientific fields of crystallography, crystal chemistry, optical mineralogy, systematic mineralogy, and petrology. They will also learn how to analyze and interpret mineralogical information in the context of rocks found in different parts of the Earth from core to crust.
- **Disciplinary Practice** Students will learn to identify a variety of minerals using basic and advanced techniques including polarized light microscopy and X-ray diffraction analysis.
- **Communication and Expression** Students will learn to communicate and express their knowledge of minerals how they inform us about the Earth's past and their role in active research areas such as geological hazards, green transition, and planetary exploration, in both written and oral forms through formal presentation and informal classroom discussions.
- Ethical, Informed, and Engaged Citizenship Students will be asked to consider and evaluate the economic and social justice issues surrounding the use of Earth's mineral resources, and will be introduced to mineralogical issues related to climate change, human health, and public policy.

Field-trip

Field trip is an essential component for a holistic learning experience in mineralogy. A one-day field trip is scheduled for Sunday Oct 6th (Weather-permitting). If you have any conflicts with this date, please let me know latest by Wednesday Sep 4th.

Textbook and Readings

The following textbook will be used in this course - Introduction to Mineralogy, 2023, by William Nesse and Graham Baird (Fourth Edition). The textbook is available through the Hamilton College Bookstore. Additional readings will be uploaded on Blackboard.

Course Schedule

Dates	Class	Lab	Assignments		
Part 1: Introduction					
Week 0 & 1 (Aug 29 to Sep 6)	What are minerals? How do they form? What do they tell us about the Earth & other planets? Minerals and Society	Lab 1: Mineral classifica- tion - How would you de- velop a scheme to classify the minerals?	Quiz #1 What are miner- als? Applications of miner- alogy (In class on Fri Sep 6)		
Part 2: Fundamentals for identifying minerals using basic to advanced analytical methods					
Week 2 (Sep 9 to Sep 13)	Physical properties of min- erals	Lab 2: Identifying minerals in hand specimens (Mineral Set #1)			
Week 3 (Sep 16 to Sep 20)	Optical properties of miner- als	Lab 3: Identifying miner- als in thin sections (Mineral Set #1)			
Week 4 (Sep 23 to Sep 27)	Crystallography fundamen- tals & Crystal Chemistry	Lab 4: Crystallography & Crystal Chemistry			
Week 5 (Sep 30 to Oct 4)	X-ray diffraction analysis	Lab 5: Identifying minerals from X-ray diffraction data (Mineral Set #1)			
Week 6 (Oct 7 to Oct 11)	Chemical analysis of miner- als	Lab 6: Chemical analysis of minerals	Field trip report (on Fri Oct 11)		
Week 7 (Oct 14 to Oct 18)	Comparing analytical meth- ods for mineral identifi- cation - When to use which method. (Individual projects assigned - Minerals & Earth in Time)	Lab 7: Identifying miner- als in thin sections (Mineral Set #2)			
Part 3: Systematic mineralogy - Minerals in the Earth from core to crust					
Week 8 (Oct 21 to Oct 25)	Introduction to minerals in the Earth's core, Native ele- ments, Introduction to min- erals in the Earth's mantle	Lab 8: Identifying miner- als in thin sections (Mineral Set #3)	Quiz #2: Mineral proper- ties and identification meth- ods (In class on Fri Oct 25)		
			Continued on next page		

Dates	Class	Lab	Assignments		
Week 9 (Oct 28 to Nov 1)	Orthosilicates (Olivine, Garnet); Diamonds; Chain silicates (Pyroxenes & Amphiboles)	Lab 9: Identifying minerals from X-ray diffraction data (Mineral Set #2)			
Week 10 (Nov 4 to Nov 8)	Oxides (Perovksite, spinel), Introduction to minerals in the Earth's crust	Lab 10: Identifying miner- als from X-ray diffraction data (Mineral Set #3)			
Week 11 (Nov 11 to Nov 15)	Frameworksilicates(quartz,tridymite,cristobalite,Felspars,Feldspathoids, zeolites)	Lab 11: Petrology			
Week 12 (Nov 18 to Nov 22)	Sheet silicates (micas and clays), Orthosilicates (zir- con, topaz, titanite, stauro- lite, chloritoid, kyanite, silli- manite, andalusite), Other minerals	Lab 12: Practice presenta- tions - Minerals & Earth in Time	Quiz 3# Mineral's in the Earth - From core to crust (In class On Fri Nov 22)		
Week 13 (Nov 25 to Nov 29)	Thanksgiving recess				
Part 4: Perspectives - Minerals and geological hazards - Minerals and economics					
Week 14 (Dec 2 to Dec 6)	Evolution of mineralogy with time - Hydrothermal alteration and how it im- pacts earthquakes & volca- noes, Economics of miner- als - Perspectives beyond geology, Minerals in other planets	Lab 13: Final presentations - Minerals & Earth in Time	Final presentation files (Due Mon Dec 2 before 5 PM, oral presentations in the lab on Tue Dec 3)		
Course Review/ Finals					
Week 15 (Dec 9 to Dec 13)	Study/ Review time	Study/ Review time			
Week 16 (Dec 16 to Dec 20) Week 16 $($			Final Examination (In Class on Fri Dec 20)		

Course Schedule - continued from previous page

Office hours

Two scheduled office hours per week (Mondays 1.30 PM - 3.30 PM and Tuesdays 9 AM - 11 AM) or by appointment. Scheduled office hours will be held in my office in the Taylor Science Center, Room 1022. Other appointments may be held via Zoom or in-person. Office hours are an opportunity for you to get to know me and for me to get to know you. While you are welcome to drop by directly during office hours, to ensure that all of you get an opportunity to talk, I highly encourage you to reserve a 20-minute slot via Calendly a day in advance (https://calendly.com/skanakiy-hamilton/office_hours_20min_reservation). If you can briefly mention what you would like to talk about, that would also help me come more prepared. Note that the time slots on Calendly are not meant to limit your time to 20 min but rather ensure that everyone who wants to come to office hours has an opportunity to talk. We can always find additional time outside of office hours to

discuss more. Come with questions about the mineralogy class, getting involved in research, career-related questions, or anything else you feel like chatting about. My goal is to help you succeed at Hamilton and beyond and I am here to help you in any way I can.

Grading

The final grades will be determined at the semester's end based on the aggregate grades for each of the below assessment criteria. The quizzes and final exam will be in multiple-choice and/or short answer format. Course grades will be assigned on the below scale.

Assessment Criteria				
Assessments	Percent of final grade			
Weekly lab exercises	30%			
Field trip participation and report	10%			
Homework Readings & Class Participation	5%			
Quiz	15%			
Minerals & Earth in Time Presentation	20%			
Final Exam	20%			

Grading Scale		
Grade values	Grade	
97-100%	A+	
93-96.9%	А	
90-92.9%	A-	
87-89.9%	B+	
83-86.9%	В	
80-82.9%	B-	
77-79.9%	C+	
73-76.9%	С	
70-72.9%	C-	
67-69.9%	D+	
63-66.9%	D	
60-62.9%	D-	
< 60%	F	

Student Resources

Support services such as the Writing Center, Quantitative and Symbolic Reasoning Center, Oral Communications Center, and Language Center are available to all students for all courses through Hamilton College.

- Writing Center: https://my.hamilton.edu/academics/centers/writing
- Oral Communication Center (OCC): https://my.hamilton.edu/academics/centers/oralcommunic ation

• Quantitative & Symbolic Reasoning Center (QSR): https://my.hamilton.edu/academics/center s/qsr

College & Classroom Policies

Attendance

Most of this course involves hands-on examination of mineral specimens, discussion of materials, and group work. It is therefore expected that students attend all classes and labs. If you must miss a class or lab, please inform the instructor by email as soon as possible and arrange to obtain notes and information from a classmate. You will still be held responsible for the content, materials, and discussion that you missed. If any extenuating circumstances will prevent you from attending class for an extended period (e.g. severe illness) please contact the Instructor as soon as possible to work out a plan. If any circumstances prevent me from coming to a class, I will inform you through email in advance or through a colleague on the day.

Honor Code

All students are required to read and abide by the Hamilton College Honor Code (http://www.hamilton.edu /student-handbook/studentconduct/honor-code). Academic integrity is expected at all times. If you are not clear on how the Honor Code applies to activities and assignments specific to this course, please be sure to ask for clarification.

Classroom Conduct

I want this class to be inclusive for all students and an environment where everyone can freely ask questions, discuss their ideas even if they are conflicting, and help each other learn. We are on this journey together and an environment of mutual respect will create a positive learning experience for everyone involved. All students are expected to familiarize themselves and abide by the Hamilton College Code of Student Conduct.

Accomodations

I want to ensure that this class is accessible to all students. Hamilton is committed to making reasonable accommodations for students with properly documented disabilities. If you are eligible to receive an accommodation(s) and would like to make a formal request for this course, please discuss it with the Instructor within the first two weeks of the semester. You will need to provide the Assistant Dean for Accessibility Resources with appropriate documentation of your disability at the start of the semester. More information is available at http://www.hamilton.edu/student-handbook/other/disability-support-services. I request that any student with a documented disability needing academic adjustments or accommodations make an appointment to speak with me within the first two weeks of the semester. All discussions will remain private/confidential.

Late Work

If there is ever a need to submit work late, please inform the instructor 48 hrs before the work is due and obtain approval. Work submitted late without informing and receiving approval from the instructor will count against the final grade. If there are extenuating circumstances (e.g., death in the family, severe illness) that prevent you from coming to class for any in-class graded work, talk to the instructor about the possibility of a make-up assignment.

Use of Technology

Feel free to use laptops/ tablets to take notes in class if you prefer. All cell phones must be silenced and put away during class, lab, and field trips. If you suscept an emergency and need to take a phone call, feel free to step out of the classroom to take the call. Some class activities will require the use of a laptop. I

will let you know in advance to bring a laptop along when needed. Use of technology other than for normal course-related work is not permitted during class, lab, or fieldwork.

Safety

Safety should be everyone's primary concern. I will let you know if any lab/ class activity requires special safety measures. If in doubt, err on the side of caution and ask the instructor. Always be cautious while handling mineral and rock specimens, thin section slides, etc. We will be taking a field trip- where closed footwear will be required. Use of inappropriate footwear could limit or exclude your participation. If you have additional concerns about your safety during outdoor course activities (e.g. allergies, severe asthma, etc.), please come discuss with me so that we can develop an appropriate plan. Always remember that you are responsible for not only your safety but for the well-being of those around you.

Support for Mental Health

There are times when each of us feels overwhelmed, anxious, or depressed. There are many resources available on campus to support you:

- Counseling Center (www.hamilton.edu/offices/counselingcenter, 315-859-4340) located at 100 College Hill Road offers individual and group therapy, peer counselors, psychiatric treatment, and a 24-hour hotline. Press option 2 to speak with a counselor 24/7/365
- Associate Dean of Students for Student Support Services Sarah Solomon (ssolomon@hamilton.edu)
- Associate Dean of Students for Academics Adam Van Wynsberghe (avanwyns@hamilton.edu)
- Your faculty advisor
- Your RA and Area Director in your residence hall

If at any time you feel suicidal or in danger of harming yourself or others, reach out for support! The Hamilton community cares and is available to help. Campus Safety is available 24/7 for urgent concerns (315-859-4000), as is the Counseling Center (315-859-4340 opt 2).

Disclaimer

The syllabus and schedule are meant to be comprehensive. However, if adjustments are needed as we progress through the course, I will inform you of any changes made and provide an up-to-date syllabus on Blackboard. Furthermore, in the event of an extended disruption of normal classroom activities, the format for this course may be modified to enable its completion within the timeframe. I will provide an updated syllabus should such a need arise which will supersede this version.