

SIO 120: Introduction to Mineralogy (Winter 2023)

Lecture: M/W 1:00 PM – 2:20 PM **Lab:** M/W 2:30-3:50 PM; T/TH 2:00-3:20 PM

Instructor- Geoffrey Cook (gwcook@ucsd.edu)

TA- Emma Ling (eling@ucsd.edu)

Welcome to the amazing world of minerals! This class is designed to provide you with a strong foundation in mineralogy and Earth materials. This includes (but is not limited to) understanding their physical properties, chemistry, crystallography, systematic classifications, formation and uses, and perhaps most importantly—identification (hand-specimen and optical microscopy). Student learning is my utmost priority as an instructor, and I encourage you to contact me or your lab TA any time you have questions or concerns. We promise to be organized, enthusiastic, and engaging.

Learning Outcomes:

- Know the definition of a mineral and understand how physical characteristics reflect chemistry and atomic structure.
- Identify common rock-forming minerals and categorize them based on chemical and physical properties using the Dana System.
- Understand basics of crystallography and identify crystal structures.
- Examine, compare, and describe mineral specimens in hand specimen and thin section.
- Analyze minerals (and rocks) in thin section using a petrographic microscope.

Class Organization:

We will meet on M/W for lecture (in-person) from 1:00-2:20 PM (PST), in Vaughan Hall 100. Labs will meet M/W from 2:30-3:50 in VH 147. You are expected to attend lectures and labs, and complete the weekly readings and assignments.

Grading:

- Weekly Canvas quizzes (open-note, open-book) on readings and lectures: 20%
- Midterm Exam (20%) and a final exam (25%) (both in person).
- Lab exercises and assignments: 35%

Note: “A” is 93% and above; “A-” is 90-92.9%; “B+” is 87-89.9%; “B” is 83-86.9%; “B-” 80-82.9%. Breakdown is the same for “C” and “D” range; <60% is an “F”. There is no curve for the class.

Textbook:

The textbook is ***Manual of Mineral Science 23rd Ed.***, by Klein and Dutrow. The text is required and will supplement the lectures. You are responsible for reading the chapters assigned, and the exams will include material covered in the text. The book is an invaluable resource for lab exercises as well. A digital version (as well as a print version) is available through the bookstore. You must have the book ASAP but no later than before the end of Week 1 (please).

Academic Integrity and Student Responsibilities:

Students are expected to complete the course in compliance with the instructor’s standards. No student shall engage in any activity that involves attempting to receive a grade by means other

than honest effort. University policies, regulations, and standards of conduct can be found on the Academic integrity office website at <http://www.ucsd.edu/current-students/organizations/academic-integrity-office/>. Submission of materials in this course constitutes an implicit affirmation of academic integrity. Please be aware that faculty are required by the UC San Diego Faculty Code of Conduct to report academic integrity violations to the UC San Diego Academic Integrity Office. ***Note that course content is protected and may not be shared, uploaded, or distributed.***

Absences and Missed Work:

In the case of legitimate conflicts, notification is required at least one week prior to the regularly scheduled examination. In the case of other emergencies or eventualities (sickness, etc.) notification is appreciated as soon as possible and must be verified by a third party.

Accommodations for Documented Disabilities:

Students requesting accommodations must provide a current Authorization for Accommodation (AFA) letter (paper or electronic) issued by the Office for Students with Disabilities (<https://osd.ucsd.edu>). Students are required to discuss accommodation arrangements with instructors and OSD liaisons in the department in advance of exams or assignments.

SIO 120 Schedule (Winter 2024)

Note: This syllabus is an outline of proposed events. It is subject to change; however, never without notification, and never to advance the due dates of assignments.

WEEK 1: JAN. 8 AND 10

M: Introduction to mineralogy: what is a mineral, why are they important? **(Ch.1)**

W: Physical properties of minerals **(Ch.2)**

LAB 1: Introduction to minerals and their physical properties

WEEK 2: JAN. 15 AND 17

M: NO CLASS (MLK Holiday)

W: Physical properties of minerals **(Ch.2)**

LAB 2: Rock-forming minerals (properties and identification)

WEEK 3: JAN. 22 AND 24

M- Crystallography: symmetry operators, crystal classes, H-M notation, crystal axes and systems **(Ch. 6-10)**

W- Crystallography: Miller index, space groups, Bravais lattices, crystal defects, twins **(Ch. 6-10)**

LAB 3: Crystallography (3D models)

WEEK 4: JAN. 29 AND 31

M- Introduction to systematic mineralogy/non-silicates **(Ch. 15-17)**

W- Non-silicate minerals **(Ch. 15-17)**

LAB 4: Non-Silicate mineral identification in hand specimen (PART 1)

WEEK 5: FEB. 5 AND FEB. 7: SYSTEMATIC MINERALOGY

M- Silicate minerals (Ch. 18-19)

W- MIDTERM EXAM

LAB 5: Non-silicate mineral identification in hand specimen (PART 2)

WEEK 6: FEB. 12 AND 14: SYSTEMATIC MINERALOGY

M- Silicate minerals (Ch. 18-19)

W- Silicate minerals (Ch. 18-19)

LAB 6: Silicate mineral identification in hand specimen (PART 1)

WEEK 7: FEB. 19 AND 21: SYSTEMATIC MINERALOGY

M- NO CLASS (PRESIDENTS' DAY)

W- Mineral chemistry and bonding (Ch. 3+4)

LAB 7: Silicate mineral identification in hand specimen (PART 2)

WEEK 8: FEB. 26 AND 28: OPTICAL MINERALOGY

M- Optical mineralogy (Ch. 13)

W- Optical mineralogy (Ch. 13)

LAB 8: The Petrographic microscope

WEEK 9: MAR. 4 AND 6: OPTICAL MINERALOGY

M- Optical mineralogy (Ch. 13)

W- Optical mineralogy (Ch. 13)

LAB 9: Rock-forming minerals in thin section

WEEK 10: MAR. 11 AND 14: OPTICAL MINERALOGY AND ANALYTICAL MINERALOGY

M- Minerals as natural resources and as hazards; economic minerals and ores (Ch. 9)

W- Analytical techniques in mineralogy (Ch. 14)

LAB 10: Rocks in thin section

Final Exam

Friday, March 22nd, 11:30AM-2:30PM, Vaughan Hall 100