

SIO 45: Volcanoes (Winter 2024)

MWF 10:00-10:50 (Center Hall 214)

Instructor: Geoffrey Cook (gwcook@ucsd.edu)

TA: Emily Rhoads (erhoads@ucsd.edu)

TA: Ally Stark (astark@ucsd.edu)

Hello, and welcome to the thrilling world of volcanology! This class is designed to give students from all backgrounds an introduction to geology, the Earth, and volcanism. You don't need a background in geology to enjoy the class and I am confident that you will learn a great deal about planet Earth and its volcanoes!

Learning Outcomes:

- Discuss fundamental geologic principles and concepts including geologic time, plate tectonics, and the rock cycle.
- Categorize Earth materials and the processes associated with their formation.
- Compare volcanic eruptions and associated products.
- Explain why volcanoes erupt and predict where volcanic eruptions are likely to occur.
- Examine the impact volcanoes have on modern society and recognize the influence geologic processes in general have on humanity.

Class Structure and Grading:

Your grade is based on the following:

- A midterm exam (25%) and a final exam (25%)
- Weekly Canvas quizzes (25%)
- Weekly homework activity, or, an engagement activity on Canvas (25%)

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.

Lecture topics and reading assignments are listed in the schedule below. Lecture notes will be posted to Canvas before class each week. Each week I will post a Canvas quiz based on lecture notes/presentations. In addition, each week there will be one Canvas-based assignment or activity. Quizzes, discussion posts, and assignments are open-note, open-book, and due each **Sunday at 11:59 PM** (Pacific Time). You are expected to work independently and submit your own work by the deadline (late assignments will not be accepted). Exams are in-person.

Textbooks and Readings

Volcanoes 2nd ed. by Francis and Oppenheimer is *recommended*. You *will* benefit from reading the text, and your experience will be enhanced. However, class lectures, notes, and other assigned readings are enough for you to succeed.

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: course content is protected and may not be shared, uploaded, or distributed.***

SIO 45 SCHEDULE (WINTER 2024)

WEEK 1: 1/8 TO 1/12

- 1-8 Welcome and introduction; what is volcanology?
- 1-10 Earth basics: formation, plate tectonics, rocks and minerals, geologic processes
- 1-12 Earth basics: formation, plate tectonics, rocks and minerals, geologic processes

OPTIONAL READING: The basics (Ch. 1); Keeping planets cool (Ch. 2); 4 classic eruptions (Ch. 3)

WEEK 2: 1/15 TO 1/19

1-15 NO CLASS (MLK Day)

- 1-17 Magma, volatiles, and “why” volcanoes erupt
- 1-19 Magma, volatiles, and “why” volcanoes erupt

OPTIONAL READING: Magma: the hot stuff (Ch. 4)

WEEK 3: 1/22 TO 1/26

- 1-22 Volcanic structures, and eruptive styles
- 1-24 Volcanic structures, and eruptive styles
- 1-26 **NO CLASS (independent work time)**

OPTIONAL READING: Volcanoes as landscape forms (Ch. 13); Types of volcanic activity (Ch. 5)

WEEK 4: 1/29 TO 2/2

- 1-29 Products of volcanic eruptions (lava flows)
- 1-31 Products of volcanic eruptions (lava flows)
- 2-2 Review for exam (Zoom)

OPTIONAL READING: Lava flows (Ch. 6)

WEEK 5: 2/5 TO 2/9

- 2-5 **MIDTERM EXAM (Center Hall 214)**
- 2-7 Products of volcanic eruptions (explosive volcanism)
- 2-9 Products of volcanic eruptions (explosive volcanism)

OPTIONAL READING: Pyroclastic eruptions (Ch. 7); What goes up must come down (Ch. 8)

WEEK 6: 2/12 TO 2/16

- 2-12 “Supervolcanic” eruptions and calderas
- 2-14 Lahars and volcanic debris flows
- 2-16 Volcanic hazards and monitoring and volcanic risk and society

OPTIONAL READING: Super-eruptions, super-volcanoes, and calderas (Ch. 11)

WEEK 7: 2/19 TO 2/23

2-19 NO CLASS (PRESIDENT’S DAY)

- 2-21 Volcanic hazards and monitoring and volcanic risk and society
- 2-23 Working with the public; volcanoes and climate

OPTIONAL READING: Eruptions and climate (Ch. 16); Volcano monitoring (Ch. 17); Reducing Volcanic Risk (Ch. 18)

WEEK 8: 2/26 TO 3/1

- 2-26 Mt. St. Helens and the 1980 eruption
- 2-28 Volcanoes of Italy
- 3-1 Yellowstone volcano (USA)

OPTIONAL READING: N/A

WEEK 9: 3/4 TO 3/8

- 3-4 Mt. Pinatubo (Philippines)
- 3-6 Hawaiian volcanism
- 3-8 Hawaii Media Friday

OPTIONAL READING: N/A

WEEK 10: 3/11 TO 3/15

- 3-11 Iceland
- 3-13 Iceland
- 3-15 Recent eruptions: La Palma (Spain); Hunga Tonga-Hunga Ha'apai (Tonga), White Island (N.Z.)

OPTIONAL READING: N/A

Final exam: Friday (3/22/24)
Center Hall 214; 8:00-11:00 AM