

SIO 45: Volcanoes
Winter, 2021
MWF 10:00-10:50 (Remote)
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Hello, and welcome to the thrilling world of volcanology! This class is designed to give students from all backgrounds an introduction to volcanism and volcanic processes. 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. Because of the ongoing COVID-19 pandemic this is a remote offering of what is usually an in-person class. It has been adapted to the remote environment, and I am mindful of the challenges that you have all faced thus far; accordingly, I will make every attempt to appreciate the challenges you face as you navigate the class. Student learning is my utmost priority and I encourage you to contact me any time you have questions or concerns. I want this to be a positive and useful learning experience for everyone. I promise to be organized, enthusiastic, and engaging with the course.

Learning Outcomes (students will be able to):

- 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%)
- A final exam (25%)
- Weekly Canvas quizzes based on the readings and lecture material (30%)
- Weekly activity or discussion post (20%)

Note: All exams, quizzes, and assignments are open-note, open-book

Lectures will take place on zoom on Mondays and Wednesdays. Fridays (unless otherwise stated in the schedule) will be office hours. Lecture topics and reading assignments are listed in the schedule below. Full lecture notes (pdf's) will be posted at the beginning of each week. In addition, Zoom recordings of the lectures will be posted each week as they occur. You are expected to read the chapters assigned in the textbook. Each week I will post a 10 pt. Canvas quiz based on the assigned readings and the lecture notes/presentations. In addition, each week there will be one assignment or discussion post (details to follow weekly). All quizzes and assignments will be due on **Sunday at 8 PM** (Pacific Standard Time). Please be sure to submit by the deadline, late assignments will not be accepted.

Textbooks and Readings

Volcanoes 2nd ed. by Francis and Oppenheimer is required for the class. There will be weekly readings assigned, and quizzes and exam questions will be based in part on the assigned readings, so it is important that you have a copy of the text.

SIO 45 Schedule (Winter 2021)

Week 1: 1/4/21 to 1/8/21

- 1-4 Welcome and introduction; What is volcanology?
- 1-6 Earth basics: formation, plate tectonics, rocks and minerals, geologic processes
- 1-8 (*Office hours*)

Reading:

The Basics: isotopes and green cheese (Ch. 1); Keeping Planets cool: volcanoes, hot-spots, and plate tectonics (Ch. 2)

Week 2: 1/11/21 to 1/15/21

- 1-11 Magma, volatiles, and why volcanic eruptions happen
- 1-13 Four classic eruptions
- 1-15 (*Office Hours*)

READING:

Four classic eruptions (Ch. 3); Magma: the hot stuff (Ch. 4)

Week 3: 1/18/21 to 1/22/21

- 1-18 NO CLASS (MLK Day)**
- 1-20 Types of volcanic structures and eruptive styles
- 1-22 Types of volcanic structures and eruptive styles

READING:

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

Week 4: 1/25/21 to 1/29/21

- 1-25 Eruptive styles (finish up if needed)
- 1-27 Products of volcanic eruptions (lava flows)
- 1-29 (*Office Hours*)

READING:

Lava flows (Ch. 6)

Week 5: 2/1/21 to 2/5/21

- 2-1 Products of volcanic eruptions (lava flows)
- 2-3 Products of volcanic eruptions (explosive volcanism)
- 2-5 (*Office Hours*)

READING:

Pyroclastic eruptions: bubbles, bangs, columns, and currents (Ch. 7)

Week 6: 2/8/21 to 2/12/21

- 2-8 MIDTERM EXAM (Canvas quiz, open during 24 hr. window; more information to follow)**
2-10 “Supervolcanic” eruptions and calderas
2-12 (*Office Hours*)

READING:

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

Week 7: 2/15/21 to 2/19/21

- 2-15 NO CLASS (PRESIDENT’S DAY)**
2-17 Volcanic hazards and monitoring
2-19 Volcanic hazards and monitoring

READING:

Volcano monitoring (Ch. 17)

Week 8: 2/22/21 to 2/26/21

- 2-22 Volcanic risk and society
2-24 Case Study: Mt. St. Helens (1980 eruption)
2-26 (*Office Hours*)

READING:

Reducing Volcanic Risk (Ch. 18)

Week 9: 3/1/21 to 3/5/21

- 3-1 Case Study: Volcanoes of Italy
3-3 Case Study: Yellowstone
3-5 (*Office Hours*)

READING:

Posted on Canvas: Yellowstone

Week 10: 3/8/21 to 3/12/21

- 3-8 Case Study: Hawai’i (including the 2018 eruption)
3-10 Case Study: Iceland *and* Case Study: Mt. Pinatubo (Philippines, 1991)
3-12 (*Office Hours*)

READING:

Eruptions and climate (Ch. 16)

Final exam – Friday 3/19/21 8:00-11:00 (PST)
(Exam will be available during a 24-hr. period; more information to follow)