

SIO 16 - Geology of National Parks Spring 2024 Syllabus

Lectures: M,W,F 2:00-2:50 in Cognitive Science Building 002

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Office hours:

- Wednesdays 3-4 p.m.
- Thursdays 11 a.m.- noon
- Fridays 11 a.m.- noon

We anticipate that these will likely be held in a hybrid mode (i.e. with a Zoom link as well as in person). On Wednesdays after class we will try to have a mixed Zoom/in-person session outdoors near the lecture hall. The Thursday and Friday sessions will be held by Zoom. Note that we may run these Zoom sessions from the computer lab at Scripps (see Resources page) if some of you might need in-person help or computer access for Google Earth exercises. We're happy to schedule additional times as needed. You can also post questions on the Discussion Board on Canvas as we will be monitoring this as well.

Overview: Have you ever wondered why there are so many geysers in Yellowstone or why there are all those rounded boulders at Joshua Tree National Park? In this class, we'll explore how geologic processes control the landscapes and features in our parks. By the end of this course, you should be able to (1) understand and describe the major processes (e.g. mountain building, volcanic activity, sedimentation, weathering, erosion, glaciation) that generate the landscapes in our national parks, (2) develop an ability to think and visualize these geologic processes in four dimensions, (3) understand how observations from the rock record are used to reconstruct the geological story of the parks and (4) recognize similarities among parks in geologic provinces and explain how these reflect the geologic processes that have shaped the western U.S.

Course Format and Grading: Grades will be based on one midterm exam (25% total), weekly activities (40%) and the final exam (35%), which will be cumulative but weighted toward the material after the midterm. **Note that both the midterm (Wed. May 8) and the final exam (Friday June 14) are in person exams.**

Weekly Activities: Each week there will be an exercise (called an activity) on Canvas that is designed to reinforce important concepts from lectures. We'll be using *Google Earth Pro* for parts of most of these exercises -- this is a great (free) tool for exploring landscapes and geological processes and hopefully will also get you excited to go visit some of the parks after the quarter ends. These activities will be due each Sunday. Late assignments generally will not be accepted but if you feel that an exception is warranted please let us know in advance.

Readings: There is no required text for this course. The readings for this course will be provided in three formats all available on Canvas.

- 1) Lecture notes (typically 4-5 pages/lecture) will be available before each class.
- 2) Powerpoint slides will also be available. Please note that nearly all slides have accompanying explanatory text in the presenter notes.
- 3) Supplementary materials in several modules on Canvas provide additional explanation for key concepts.

The OpenGeology introductory geology textbook is a helpful resource that is available free online at <https://opengeology.org/textbook/>. Also, *Geology and Landscapes of America's National Parks* (published in 2022 by UC Davis Professor Dave Osleger, who helped develop this course) and *Parks and Plates* (published in 2005 by R. J. Lillie) are great resources for additional background reading; a few copies of these are on reserve in the library.

Academic Integrity: This course will adhere to the UCSD policy on academic integrity, which states in part: "For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind." Any suspected cheating will be dealt with following the UCSD policy on Academic Integrity Office site <https://students.ucsd.edu/academics/academic-integrity/index.html>. I have typically followed the [faculty-to-faculty advice](#) on consequences for academic integrity violations, which recommends a reduced assessment grade for more minor violations and a failing grade for violations on exams.

A note on collaborative work: Work on the activities (but obviously not exams) for this course may be collaboratively done, but the work you hand in must be your own. A simple way to figure out if the work is your own is to ask whether or not you can reproduce it completely without the aid of other people. Many of the exercises will have a space for you to note any collaborations that you might have had or resources that you might have used. A blank answer here will be taken as an affirmative statement that the work is all your own.

Students with Disabilities: We are happy to provide accommodations for this course for students with documented disabilities. Students must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD), located in University Center 202. Please provide your instructor and the OSD Liaison for the SIO department, Sid Eads (sleads@ucsd.edu) a copy of your AFA letter in advance so that accommodations can be arranged.

Field Trip: For those interested there will be an optional ~2 hour trip (1-3 p.m.) on Sat. April 20 where we will look at some of the local sedimentary rocks near the Scripps pier.

<u>Date</u>	<u>Topic</u>	<u>Activity</u>
April 1	Grand Canyon - a geologic view of time	
April 3	Grand Canyon - interpreting the sedimentary record	
April 5	Grand Canyon - relative time in the geologic record	Activity 1 due 4/7
April 8	Grand Canyon and Google Earth intro	
April 10	Grand Canyon - uplift and canyon incision	
April 12	Zion - weathering, erosion and the role of fractures	Activity 2 due 4/14
April 15	Arches, Canyonlands - arches, buttes and mesas	
April 17	Bryce Canyon, Capitol Reef	
April 19	Hawaii - lava flows, rift zones and volcanic features	Activity 3 due 4/21
April 20	Optional local field trip at Scripps (1 p.m.-3 p.m.)	
April 22	Plates, plumes and the Hawaiian volcanic chain	
April 24	Cascade volcanoes - subduction setting, explosive volcanism	
April 26	Cascade volcanoes: Crater Lake	Activity 4 due 4/28
April 29	Cascade volcanoes: Lassen, Rainier	
May 1	Seafloor spreading and convergent margins (Olympic)	
May 3	Sierra Nevada - origin of Sierran granites	Activity 5 due 5/5
May 6	Yosemite - tracking glaciers in the Sierra Nevada	
May 8	Midterm exam	
May 10	Yosemite - cracks, joints and the Yosemite landscape	Activity 6 due 5/12
May 13	The Rocky Mountains: multiple uplifts and Rocky Mountain NP	
May 15	The Rocky Mountains: Glacier NP and the northern Rockies	
May 17	The Rocky Mountains: Grand Teton NP	Activity 7 due 5/19
May 20	Death Valley, Basin and Range extension	
May 22	Death Valley - faulting, wind features, sliding stones	
May 24	San Andreas Fault and Joshua Tree NP	Activity 8 due 5/26
May 27	No Class -- Memorial Day	
May 29	Yellowstone - super eruptions above a continental hot spot	
May 31	Yellowstone - geysers, hydrothermal activity	Activity 9 due 6/2
June 3	The Appalachian Mountains (Shenandoah)	
June 5	Assembling western North America	
June 7	Alaska parks (Denali, Katmai) - far-traveled terranes	Activity 10 due 6/9

Final exam: Friday, June 14; 3:00 p.m. - 6:00 p.m.