



# USC University of Southern California

## GEOL 105Lg: Planet Earth (4 Units)

### Calendar

**Term-Day-Time:** Fall Tu/Th 3:30-4:50 pm.

**Location:** THH 201 (Taper Hall).

**Instructor:** Prof. Sylvain Barbot ([sbarbot@usc.edu](mailto:sbarbot@usc.edu)).

**Office Hours:** Upon appointment, ZHS 105.

**Mid-term I:** Tuesday, September 13, 2022.

**Mid-term II:** Tuesday, October 11, 2022.

**Mid-term III:** Thursday, November 10, 2022.

**Fall Recess:** October 13-14.

**Field Trip:** One day in October 22 or October 23, based on COVID conditions.

**Thanksgiving Holiday:** November 23 – November 27.

**Final Exam:** Tuesday, December 13 from 2 to 4 pm.

### Teaching Assistants

Judith Gauriau ([gauriau@usc.edu](mailto:gauriau@usc.edu))

Zhengze Li ([zhengzel@usc.edu](mailto:zhengzel@usc.edu))

Shreya Ramesh ([sjramesh@usc.edu](mailto:sjramesh@usc.edu))

Binhao Wang ([binhaowa@usc.edu](mailto:binhaowa@usc.edu))

Siyuan Zhang ([szhang47@usc.edu](mailto:szhang47@usc.edu))

**TA Office Hours:** Contact your TA.

### Course Description

Earth is a dynamic system that has emerged from billions of years of evolution. Unique in the solar system, the young face of our planet is preserved by the many feedbacks from processes that have shaped the air we breathe and the landscapes we roam. These processes have operated at time scales that are challenging to grasp, but are now altered and accelerating. Because of the large human population and its environmental footprint, the world's ecosystems are changing faster than ever before. Species are disappearing at alarming rates on land and offshore. Global temperatures are warming, sea levels are rising, and climate is changing. To better appreciate the fragility of our environment, we will discuss our origins. How did our planet form? How did life appear? How did species and their environment co-evolve? What was the climate like throughout Earth's history and how do we know? We will plunge into deep time to better understand our present and positively influence our future. We will examine the Earth as a physical system and describe the pathways of change, the causes and effects, and the current challenges of humanity in the face of a rapidly changing planet.

### Learning Objectives

By the end of this course, the students will be able to recall the major events that took place throughout Earth's history. The students will be able to describe the major layers of the Earth and its atmosphere and to identify the major types of rocks. The students will be able to recognize important tectonic regions on Earth and their significance. The students will be able to understand the different factors that affect the climate and how the climate has evolved in all of Earth's history. The students will familiarize themselves with natural hazards, including

earthquakes, volcanos, and sea-level rise. The students will familiarize themselves with different types of maps and develop scientific literacy. Overall, the students will learn about the impacts of human activity on the natural world and the consequences on climate, ecosystems, and future sustainability.

### Prerequisites:

This is a General Education class and there are no prerequisites.

### Communication

Regular communication will be conducted through Blackboard (<https://blackboard.usc.edu>). In-class participation will be conducted using Blackboard. Ask for appointment with class instructor or teaching assistant via email. All lectures videos and slides will be posted on Blackboard well before the class.

### Lectures

From Tuesday August 23<sup>rd</sup> to Thursday December 1<sup>st</sup>, there will be 26 lectures. The lectures are 80 minutes long on Tuesday and Thursday from 3:30 pm to 4:50 pm in THH 201. All lectures slides will be posted on Blackboard before the class. The lectures include an ungraded quiz to help you prepare for the exams.

### Examinations

There will be three mid-term exams and one final exam. Mid-term I will be on **Tuesday, September 13<sup>th</sup>, 2022**, Mid-term II will be on **Tuesday, October 11<sup>th</sup>, 2022**, and Mid-term III on **Tuesday November 8<sup>th</sup>, 2022**. The mid-term take place at THH 201 instead of the regular the lecture. The Final examination will be on **Tuesday December 13<sup>th</sup>**, 2-4 pm. The lecture notes include bold words. Make sure that you can define them and use them in context. This will be tested during the mid-terms and the final. The mid-terms and final-exam questions are selected entirely from the Polleverywhere questions that we discuss at the beginning of class. We will not provide more study material.

### Required Materials

Access to a smartphone or a computer is required for online attendance and to watch the recorded lectures.

### Assignments

The assignments are to read the relevant notes before the laboratory and to take a quiz between two labs. The lab quizzes and lab attendance count for 25% of the final grade. Extra credit can be obtained by participating in JEP (15%) and the field trip (10%). There is no other form of extra credit.

### Grading Breakdown

There will be 3 mid-term exams, overall representing 50% of the final grade. We will have a final exam, which will count for 25% of the final grade. Attendance of the laboratory and quiz will count the remaining 25%. You must pass the lab component to pass the course. For P/NP option, P requires a C or better. Participating in the Joint Education Program (<https://dornsife.usc.edu/joint-educational-project>) provides up to 15% extra credit. There will be no other form of extra credit.

Assignment	% of Grade
Mid-term I	10
Mid-term II	15
Mid-term III	20
Laboratory quiz and attendance	25
Final exam	30
Total	100
Extra credit: Joint Education Program	15

### **Academic Accommodations**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. DSP can be reached at [ability@usc.edu](mailto:ability@usc.edu) and is open 8:30am-5:00pm Monday through Friday. The phone number for DSP is 213-740-0776.

### **Academic integrity**

University policies on academic dishonesty are printed in SCAMPUS. Because cheating negatively affects everyone in the class, we will follow USC guidelines and report all academic misconduct. USC policies on cheating are strict and the minimum punishment is failure in the class and possible expulsion. Please don't make us have to turn you in! And remember that even the appearance of impropriety can be a concern.

More information at <https://policy.usc.edu/scampus/>.

### **Attendance**

We will accommodate student athletes who cannot attend a lecture, quiz, or mid-term exam with approved Travel Request Letters. We will also accommodate students who give advance notice of religious observation. In each case, we will work with you to find another date to schedule the exam, preferably in the first few days following the original date.

### **Classroom norms**

Student participation during lecture and laboratories is encouraged. Always feel free to ask questions and clarifications. The comments that you make (asking for clarification, sharing critiques, expanding on a point) should reflect that you have paid attention to the instructor comments. Active participation in the laboratories is also strongly encouraged. Do not hesitate to solicitate your teaching assistant should you have any questions with the material.

### **Lecture outline**

1. Origin of the Universe
2. Threats from outer space
3. Formation of the Solar system
4. Water worlds
5. Planet Earth
6. Birth of Earth's crusts
7. The rock cycle
8. Matter
9. Geologic time
10. Life
11. Origin of life
12. Precambrian life
13. From trilobites to dinosaurs
14. The age of mammals
15. Plate tectonics I
16. Plate tectonics II
17. Seismology
18. Earthquakes

19. Volcanism
20. Seismic hazard
21. Physical oceanography
22. Atmosphere
23. Paleoclimate
24. Climate change
25. Anthropocene and mass extinctions

Lecture content is subject to change without warning.

## Laboratory schedule

<u>Week starting on</u>	<u>Subject</u>
August 22	No lab (Start of class)
August 29	Planetary geology
September 5	Minerals
September 12	Igneous rocks
September 19	Sedimentary and metamorphic rocks
September 26	Geologic time
October 3	Fossil record
October 10	No lab (Fall recess)
October 17	Mass extinctions
October 24	Plate tectonics
October 31	Earthquakes
November 7	Volcanos
November 14	Global warming and sea-level rise
November 21	No lab (Thanksgiving)
November 28	Topographic maps

Classes end on Friday December 2<sup>nd</sup>, 2022.

Softcopies of lab handouts will be given out each week. **Students must print their own handout before the labs.** Students must read the material before the lab. Each lab will start with a quiz.

You may switch lab schedule if you find a fellow student that wants to switch with you. This is the only way to switch lab. Inform you TA of the switch. We will accommodate your time constraints as much as possible.

## Field trip

There will be a field trip on either October 22 and October 23, 2022 to visit geological and engineering sites around Los Angeles. Each trip will be a day trip with bus transportation. You will need to bring hiking shoes, comfortable pants or short, and your own lunch and water. The field trip is optional for extra credit (10%). There will be no make-up opportunity if you cannot attend, whatever the reason. The trips will be organized on two different days during the weekend to accommodate your potential timing conflicts. You are invited to participate in both of the field trips, but they are to the same destination. Only one field trip is required for extra credit. Attending both field trips does not give you additional credit than attending only one of them.

The field trip is to the San Andreas Fault around Palmdale, CA. We will meet at 7:15 am in front of the Earth Sciences Zumberge Hall (ZHS) and embark on the bus at 7:30 am. We will first visit Vasquez Rocks (<https://parks.lacounty.gov/vasquez-rocks-natural-area-and-nature-center/>), located in the high desert near Agua Dulce Springs, featuring spectacular rock formations and scenic landscapes. The rock layers of Vasquez have been tilted by the same forces that created the nearby San Andreas Fault. In 1874, Tiburcio Vasquez, one of California's most notorious bandits, used these rocks to elude capture by law enforcement. He was eventually wounded, captured, and hung. His name has since been associated with this geologic feature. The park has been used in many movies, television shows, and commercials. We will then visit an aqueduct that crosses the fault. We will discuss how the aqueduct contributes to the water budget in Los Angeles. Finally, we will visit an outcrop of the San Andreas Fault, which is currently overdue for a large earthquake. This involves walking short distances in rugged terrain, as you walk from the Pacific Ocean plate and the North American plate. We will be back at USC at 7 pm.

In order for us to book and schedule buses, please register for the field trip on Blackboard before Tuesday, September 13<sup>th</sup>. Remember, the field trip is optional, but your enthusiasm is not. Your active participation throughout the day is required – no staying in bus while others engage in the field trip activities. Bring anything you might need throughout the day, including water, food, sun screen, and personal hygiene items. There are toilets at Vasquez Rocks and in the bus.

### **Optional textbook**

Brian J. Skinner and Barbara W. Murck, *The Blue Planet, An introduction to Earth System Science*, Wiley ed.

### **Recommended reading**

Robert M. Hazen, *The Story of Earth*, Penguin Books

Yuval Noah Harari, *Sapiens, A Brief History of Humankind*

Elizabeth Kolbert, *The Sixth Extinction: An Unnatural History*

David Berkocivi, *The Origins of Everything in 100 Pages (More or Less)*.

Bill Bryson, *A Short History of Nearly Everything*

David Attenborough, *Life*

## Statement on Academic Conduct and Support Systems

### Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](http://policy.usc.edu/scampus-part-b). Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

### Support Systems:

*Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call*

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. [engemannshc.usc.edu/counseling](http://engemannshc.usc.edu/counseling)

*National Suicide Prevention Lifeline – 1 (800) 273-8255*

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. [www.suicidepreventionlifeline.org](http://www.suicidepreventionlifeline.org)

*Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call*

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. [engemannshc.usc.edu/rsvp](http://engemannshc.usc.edu/rsvp)

*Sexual Assault Resource Center*

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: [sarc.usc.edu](http://sarc.usc.edu)

*Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086*

Works with faculty, staff, visitors, applicants, and students around issues of protected class. [equity.usc.edu](http://equity.usc.edu)

*Bias Assessment Response and Support*

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. [studentaffairs.usc.edu/bias-assessment-response-support](http://studentaffairs.usc.edu/bias-assessment-response-support)

*The Office of Disability Services and Programs*

Provides certification for students with disabilities and helps arrange relevant accommodations. [dsp.usc.edu](http://dsp.usc.edu)

*Student Support and Advocacy – (213) 821-4710*

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. [studentaffairs.usc.edu/ssa](http://studentaffairs.usc.edu/ssa)

*Diversity at USC*

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. [diversity.usc.edu](http://diversity.usc.edu)

*USC Emergency Information*

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. [emergency.usc.edu](http://emergency.usc.edu)

*USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.*

Provides overall safety to USC community. [dps.usc.edu](http://dps.usc.edu)