

# Geosciences 251 Physical Geology

## Fall 2021

### Course Description

Introduction to Earth's materials; surface and internal geologic processes; plate tectonics; and geologic time. Includes practical experience in rock and mineral identification, topographic maps, and applied problems in geosciences.

### Pre-requisites

None

### Review periods

Tuesday/Thursday, 11:00-12:15 AM; M Pacheco ILC 150

### Lab sections

Monday (includes Honor's Section) 12:00-2:50 (TBD)

Tuesday 12:30-3:20 (TA TBD)

Tuesday 5:00-7:50 (TA TBD)

Wednesday 12:00-2:50 (TA TBD)

Thursday 12:30-3:20 (TA TBD)

Friday 12:00-2:50 (TA TBD)

### Instructor

Rick Bennett: rb0@ arizona.edu

Office hours via zoom *by appointment* between 12:30-2:00 on Tues & Thurs

### Teaching Assistants

Lydia Bailey

lydiabailey@email.arizona.edu

Office Hours 8:00-10:00 am on Wednesday in GS 201 or on Zoom; Teaching

Wednesdays and Fridays 12:00 pm labs

Anca Barla

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Office Hours 8:00-10:00 am on Mondays in GS 201 or on Zoom; Teaching Mondays

12:00 pm and Tuesdays 5:00 pm labs

Liam O'Connor

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Office Hours 4:00-5:00 pm on Tuesdays in GS 201 or on Zoom; Teaching

Tuesdays 12:30 pm lab

Chance Ronemus

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Office Hours 11:00-12:00 pm on Fridays in GS 201 or on Zoom; Teaching Thursdays

12:30 pm lab

## Course format and teaching methods

*To ensure everyone's safety and to comply with university mandates, facemasks must be worn by all class participants during all in person activities, including lecture and lab periods. For current face covering requirements please see the University of Arizona COVID19 Response page for mask requirement details.*

A typical week will include will include the following four elements:

1. *Reading*: Students will complete reading assignments each week *before* each class period. Most reading will focus on the chapters of the text book. Some additional reading may be assigned. If additional reading is assigned materials will be provided on D2L.
2. *Review sessions (optional)*: All lecture periods (in person in ILC 150) will be used to review and assess understanding gained from the assigned reading via ungraded quizzes. Please be prepared to participate in class discussions and answer questions from the instructor. Participation in “quiz-reviews” is optional. **But please come to class on the first day (Aug 24).**
3. *Homework*: You will be assigned homework nominally once per week. These *graded* assignments must be completed and uploaded to D2L before the Thursday of the next week. For example, a homework assigned for week 1 must be uploaded to D2L prior to the beginning (11 AM) of the following Thursday quiz-review of week 2. These deadlines will be strictly enforced automatically in D2L.
4. *Lab exercises*: Labs will be offered in person. Attendance in labs is required. The labs will generally consist of 1-1.5 hours of instruction and activities guided by teaching assistants (TA's). A lab assessment or “quiz” will be associated with each lab. Some additional individual homework may be necessary to complete the lab assignments. Lab assignments are to be completed and uploaded to D2L before class on the Tuesday of the following week, regardless of which lab section you are enrolled in. These deadlines will be strictly enforced automatically in D2L.
5. *Virtual field trip*: Each student will be required to work through a virtual field trip and to complete an exercise related to the field trip. The field trip will be made available via D2L later in the semester.

Please refer to the schedule at the end of this document to keep track of all assignment dates and meeting periods. We will also be using the Calendar feature in D2L.

## Honors Students

Honors students will meet separately with the instructor each month at a time when we are all available (to be determined). We will investigate the geologic history of Italy, and consider its impact on human history, the development of geology as a science, and modern society.

## Final examination or project

There is no final examination in this course, but there will be a final homework assignment.

### **Textbook (required)**

*Understanding Earth* by Grotzinger & Jordan (8th edition). You will need this text for both lecture and lab. The 8th edition should be available to you in E-format on D2L as part of the Inclusive Access program. If you do not want to pay for this resource, you must opt out on D2L by 09/06/2021 (the last day to drop classes).

### **Other required or special materials**

Protractor, ruler, calculator, geologic time scale (PDF available to print on D2L)

### **Computer requirements**

You will need an internet connection and a device that provides access to D2L (to both download and upload files). No assignments will be turned in on paper. You will need access to Microsoft PowerPoint to create slides and to record a presentation (details below). You may also need occasional access to Excel or software that provides similar calculation/graphing capabilities. You will also need access to Google Earth for a virtual field trip. If you have computer related issues, please seek assistance from: <https://student.it.arizona.edu/resources>

### **Mobile devices for interactive quiz-review sessions**

We will use the game-based learning platform Kahoot to test our understanding of the reading material during lecture periods. To access Kahoot during a quiz-review session, you will need a laptop computer, cell phone, tablet, or similar device that provides access to the Internet via a web browser. At the beginning of each class the instructor will generate a passcode to be entered at <https://kahoot.it>. The interactive quiz-reviews are intended to be a fun way to assess your learning. The quizzes are ungraded and your attendance at quiz-review sessions is optional.

### **Course website**

Course materials will be posted on D2L.

### **Other course communications**

Communications for this course will take place using D2L. Office hours will be held by appointment over Zoom.

### **Course Objectives**

This course provides an introduction to many of the primary topics in Earth Science, such as:

- the characteristics and origin of common rocks and minerals
- how rocks are deformed and the structures that are produced
- important processes operating in the atmosphere, in the oceans, and on the land surface; and how these processes impact humans and are impacted by human activities
- origin and use of mineral and energy resources
- geologic history of the world, North America, and Arizona
- interpretation of topographic and geologic maps

### **Expected Learning Outcomes**

On completion of this course, students will:

- have a working knowledge of common Earth materials, their composition, origin, & uses
- understand Earth surface processes & how humans affect & are affected by these processes
- understand processes operating in the Earth's interior
- know the geologic time scale & major Earth events
- acquire skills required for study & interpretation of geological materials, history, & features

-- understand the scientific process

### **Attendance Policies related to COVID-19**

If you feel sick, or have any of the symptoms of COVID-19, do not come to review sessions or labs. If you have recently had close contact with a person with COVID-19, do not come to review sessions or labs.

**For the safety of everyone in the class, face coverings are required in all University of Arizona buildings.** For current face covering requirements please see the University of Arizona COVID19 Response page for mask requirement details. Face coverings that cover the nose, mouth, and chin are required to be worn in all learning spaces at the University of Arizona (e.g., in classrooms, laboratories and studios). Any student who violates this directive will be asked to immediately leave the learning space, and will be allowed to return only when they are wearing a face covering. Subsequent episodes of noncompliance will result in a Student Code of Conduct complaint being filed with the Dean of Students Office, which may result in sanctions being applied. The student will not be able to return to the learning space until the matter is resolved.

### **Classroom Behavior**

The University of Arizona "Threatening Behavior by Students" Policy prohibits threats of physical harm any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

Please refrain from engaging in non-course-related activities during lecture, (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Using devices (e.g., laptops, tablets, cell phones) to follow lecture materials and take is fine. Please avoid using devices in a way that other students may find disruptive or distracting.

### **Assignments, Grading Scale and Policies**

Following is the distribution of points for each of the course activities. You will be able to monitor your grade in D2L during the semester.

*Homework assignments:* There will be a total of 12 regular homework assignments @ 50 points each (with the two lowest scores dropped) = 500 points, plus one additional "final" homework worth 100 points. The final homework cannot be dropped. Typically homework due dates will be staggered with lab assignment due dates. The final homework will consist of a recorded, 5-slide PowerPoint presentation addressing one question selected from a list of questions to be provided

Instructions for how to record your presentation may be found at: <https://www.microsoft.com/en-us/videoplayer/embed/RWfvXC?pid=ocpVideo0-innerdiv-oneplayer&postJsllMsg=true&maskLevel=20&market=en-us>

*Lab exercissess:* Each of the 10 labs is associated with an assignment (20 points) and an assessment/quiz (10 points) = 300 points.

*Field trip exercise:* The field trip will include an exercise to be completed as homework. This exercise will be worth 100 points.

Note that there are no lecture or lab exams in this course. No opportunities for extra credit will be provided.

### **Late work policy**

Late homework will be accepted, but 5 points will be deducted for each day past the deadline.

### **Total = 1000 points**

Letter grades will be assigned based on your point total as:

A = 1000-895

B = 894-795

C = 794-695

D = 694-595

F = < 595

### **A few tips for doing well in this course**

- Make sure that you stay current with reading, labs, and all assignments. Do not fall behind!
- Participate in quiz-reviews to test your understanding.
- See your instructors or TA's on Zoom if you have questions or need assistance.

### **Code of Academic Integrity**

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See:

<http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

### **Incomplete (I) or Withdrawal (W):**

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

### **UA Nondiscrimination and Anti-Harassment Policy**

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

### **Accessibility and Accommodations**

It is the University's goal that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability or pregnancy, please let your instructors or TA's know immediately so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations.

### **Additional Resources for Students**

UA Academic policies and procedures are available at: <http://catalog.arizona.edu/policies>

Campus Health provides quality medical and mental health care services through virtual and in-person care. <http://www.health.arizona.edu/>

Phone: 520-621-9202

Counseling and Psych Services (CAPS) provides mental health care, including short-term counseling services. <https://health.arizona.edu/counseling-psych-services>  
Phone: 520-621-3334

The Dean of Students Office's Student Assistance Program helps students manage crises, life traumas, and other barriers that impede success. The staff addresses the needs of students who experience issues related to social adjustment, academic challenges, psychological health, physical health, victimization, and relationship issues, through a variety of interventions, referrals, and follow up services. Phone: 520-621-7057  
<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>  
Email: DOS-deanofstudents@email.arizona.edu

The Survivor Advocacy Program provides confidential support and advocacy services to student survivors of sexual and gender-based violence. The Program can also advise students about relevant non-UA resources available within the local community for support.  
<https://survivoradvocacy.arizona.edu/>  
Email: survivoradvocacy@email.arizona.edu  
Phone: 520-621-5767

### Subject to change statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.

### Detailed schedule of activities and deadlines

\* indicates date and time according to section number; HW = homework

#### Week 1

Date	Reading	Activity	Time	Location	Topic
08/24		Quiz-review 1	11am	ILC 150	Introduction to the course
08/26	Chapters 1	Quiz-review 2	11am	ILC 150	The Earth system
*		Lab --	*	GS 201	<b>No labs the week of Aug 30</b>

#### Week 2

Date	Reading	Activity	Time	Location	Topic
08/31	Chapter 2	Quiz-review 3	11am	ILC 150	Plate tectonics
09/02		<b>HW 1 due</b>	<b>11am</b>	<b>D2L</b>	
09/02	Chapter 3	Quiz-review 4	11am	ILC 150	Minerals: the building blocks of rocks
*		Lab 1	*	GS 201	Minerals (part 1)

#### Week 3

Date	Reading	Activity	Time	Location	Topic
09/07		<b>Lab 1 due</b>	<b>11am</b>	<b>D2L</b>	
09/07	Chapter 3	Quiz-review 5	11am	ILC 150	Rocks: records of geologic processes
09/09		<b>HW 2 due</b>	<b>11am</b>	<b>D2L</b>	
09/09	Chapter 4	Quiz-review 6	11am	ILC 150	Igneous rocks
*		Lab 2	*	GS 201	Minerals (part 2)

#### Week 4

Date	Reading	Activity	Time	Location	Topic
09/14		<b>Lab 2 due</b>	<b>11am</b>	<b>D2L</b>	
09/14	Chapter 4	Quiz-review 7	11am	ILC 150	Igneous processes
09/16		<b>HW 3 due</b>	<b>11am</b>	<b>D2L</b>	
09/16	Chapter 5	Quiz-review 8	11am	ILC 150	Volcanism

\* Lab 3 \* GS 201 Igneous rocks

*Week 5*

Date	Reading	Activity	Time	Location	Topic
09/14		<b>Lab 3 due</b>	<b>11am</b>	<b>D2L</b>	
09/14	Chapters 6	Quiz-review 9	11am	ILC 150	Sedimentary rocks
09/16		<b>HW 3 due</b>	<b>11am</b>	<b>D2L</b>	
09/16	Chapters 7	Quiz-review 10	11am	ILC 150	Metamorphic rocks
*		Lab 4	*	GS 201	Sedimentary rocks

*Week 6*

Date	Reading	Activity	Time	Location	Topic
09/21		<b>Lab 4 due</b>	<b>11am</b>	<b>D2L</b>	
09/21	Chapter 9	Quiz-review 11	11am	ILC 150	Sedimentary rocks & geologic time
09/23		<b>HW 4 due</b>	<b>11am</b>	<b>D2L</b>	
09/23	Chapter 9	Quiz-review 12	11am	ILC 150	Sedimentary rocks & geologic time
*		Lab --	*	GS 201	<b>No labs the week of Sep 20</b>

*Week 7*

Date	Reading	Activity	Time	Location	Topic
09/28	Chapter 8	Quiz-review 13	11am	ILC 150	Rock deformation
09/30	Chapter 8	Quiz-review 14	11am	ILC 150	Rock deformation
*		Lab 5	*	GS 201	Metamorphic rocks

*Week 8*

Date	Reading	Activity	Time	Location	Topic
10/05		<b>Lab 5 due</b>	<b>11am</b>	<b>D2L</b>	
10/05	Chapter 10	Quiz-review 15	11am	ILC 150	Faults & earthquakes
10/07		<b>HW 5 due</b>	<b>11am</b>	<b>D2L</b>	
10/07		Quiz-review 16	11am	ILC 150	Mid-term review
*		Lab 6	*	GS 201	Topographic maps

*Week 9*

Date	Reading	Activity	Time	Location	Topic
10/12		<b>Lab 6 due</b>	<b>11am</b>	<b>D2L</b>	
10/12	Chapter 10	Quiz-review 17	11am	ILC 150	Faults & earthquakes
10/14		<b>HW 6 due</b>	<b>11am</b>	<b>D2L</b>	
10/14	Chapters 11	Quiz-review 18	11am	ILC 150	Earth's interior
*		Lab 7	*	GS 201	Structural geology

*Week 10*

Date	Reading	Activity	Time	Location	Topic
10/19		<b>Lab 7 due</b>	<b>11am</b>	<b>D2L</b>	
10/19	Chapters 11	Quiz-review 19	11am	ILC 150	Earth's interior
10/21		<b>HW 7 due</b>	<b>11am</b>	<b>D2L</b>	
10/21	Chapters 12	Quiz-review 20	11am	ILC 150	The climate system
*		Lab --	*	GS 201	<b>No labs the week of Oct 18</b>

*Week 11*

Date	Reading	Activity	Time	Location	Topic
10/26	Chapters 13	Quiz-review 21	11am	ILC 150	Civilization as a geosystem
10/28	Chapter 14	Quiz-review 22	11am	ILC 150	Anthropogenic global change
*		Lab 8	*	GS 201	Earthquakes & seismology

*Week 12*

Date	Reading	Activity	Time	Location	Topic
11/02		<b>Lab 8 due</b>	<b>11am</b>	<b>D2L</b>	

11/02	Chapter 15	Quiz-review 23	11am	ILC 150	Cryosphere
11/04		<b>HW 8 due</b>	<b>11am</b>	<b>D2L</b>	
11/04	Chapters 16	Quiz-review 24	11am	ILC 150	Earth surface processes
*		Lab 9	*	GS 201	Plate tectonics

*Week 13*

Date	Reading	Activity	Time	Location	Topic
11/02		<b>Lab 9 due</b>	<b>11am</b>	<b>D2L</b>	
11/02	Chapter 17	Quiz-review 25	11am	ILC 150	Hydrology
11/04		<b>HW 9 due</b>	<b>11am</b>	<b>D2L</b>	
11/04	Chapter 18	Quiz-review 26	11am	ILC 150	Stream transport
*		Lab --	*	GS 201	<b>No lab the week of Nov 1</b>

*Week 14*

Date	Reading	Activity	Time	Location	Topic
11/09		<b>Lab 10 due</b>	<b>11am</b>	<b>D2L</b>	
11/09	Chapter 19	Quiz-review 27	11am	ILC 150	Coastlines
<b>11/11</b>		<b>Veteran's Day</b>			<b>No class</b>
*		Lab --	*	GS 201	<b>No labs the week of Nov 8</b>

*Week 15*

Date	Reading	Activity	Time	Location	Topic
11/16		<b>HW 10 due</b>	<b>11am</b>	<b>D2L</b>	
11/16	Chapter 19	Quiz-review 28	11am	ILC 150	Deserts
11/18	Chapter 20	Quiz-review 29	11am	ILC 150	Early history of terrestrial planets
*		Lab --	*	GS 201	<b>No labs the week of Nov 15</b>
<b>11/20</b>	<b>Virtual field trip Exercise due by the end of the day</b>				

*Week 16*

Date	Reading	Activity	Time	Location	Topic
11/23	Chapter 21	Quiz-review 30	11am	ILC 150	History of the continents
<b>11/25</b>		<b>Thanksgiving</b>			<b>No class</b>
*		Lab --	*	GS 201	<b>No labs the week of Nov 22</b>

*Week 17*

Date	Reading	Activity	Time	Location	Topic
11/30	Chapter 22	Quiz-review 31	11am	ILC 150	Geobiology
12/02	Chapter 22	Quiz-review 32	11am	ILC 150	Geobiology
*		Lab 10	*	GS 201	Paleoclimate

*Week 18*

Date	Reading	Activity	Time	Location	Topic
12/07		Quiz-review 32	11am	ILC 150	Whole course review
<b>12/14</b>		<b>HW 11 due</b>	<b>11am</b>	<b>D2L</b>	<b>To be determined</b>
*		Lab --	*	GS 201	<b>No labs the week of Dec 6</b>