

## ERTH101 Dynamic Earth, Spring 2021-Section 001 Online

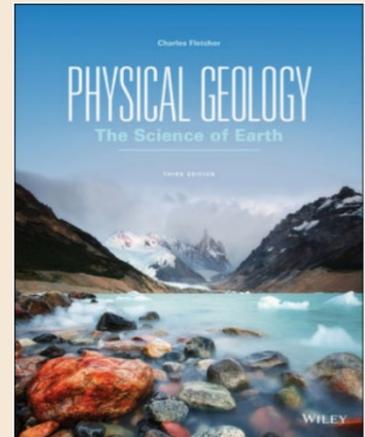
In this online course you will learn about the types of materials that compose the Earth; the forces driving **plate tectonics**, the styles of volcanic **eruptions**; the construction of **mountains**; the types of **earthquake hazards**; how weathering, erosion, and landslides **form valleys** and **supply soil**; the **supply of freshwater** in **watersheds** and **rivers**; the causes and impacts of **climate change**; how **sea level rise** and **hurricanes** change the **coastal zone**; and how **humans impact ocean ecology**. These topics are of huge **scientific, economic, and ecologic** importance and lay the foundation for one's ability to make informed decisions about our environment, for additional studies and [careers related to the geosciences \(click to see salaries\)](#).



**Instructed by Prof. Garrett Apuzen-Ito**, POST 810, [gito@hawaii.edu](mailto:gito@hawaii.edu)

Office hours: are weekly (times TBA), via Zoom. I also respond promptly to email.

Required Textbook: ***Physical Geology: The Science of Earth***, 3rd Edition, Fletcher, C. E-book through Wiley Engage



Class Format: I provide regular weekly email contact and opportunities for discussion forums. Video lectures will cover the essential information and re-enforce weekly reading assignments. Weekly problem sets as well as exams will be done on Laulima. You may do the class following the weekly scheduled due dates or work ahead finish the class early.

### Why take a class in geoscience?

1. To understand your home planet and **why the land is continually changing**
2. To learn about **natural hazards** (earthquakes, volcanos, tsunamis, coastal erosion), **natural resources** (minerals, energy, water, soil), and climate change.
3. To improve your ability to make **well-reasoned, knowledge-based decisions** in your profession and to **benefit your community**.
4. To major in, and pursue a [well-paid and greatly needed career in the Earth and Environmental Sciences](#).

### Schedule of Topics

Week	Reading	Weekly Topic
1	Chapters 1, 2	Why Geology? Origin of the Earth and Solar System
2	Chapters 3	What is <b>plate tectonics</b> ?
3	Chapter 4, 5	What is the origin of <b>rocks</b> and <b>minerals</b> ? Where do <b>metals</b> come from?
4	Chapter 6	What creates <b>volcanoes</b> ? What is the origin of the <b>Hawaiian Islands</b> ?
	<u>First Exam</u> , Chapters 1-6	
5	Chapters 7, 8	What is <b>sediment</b> ? Where does <b>soil</b> come from?
6	Chapters 9, 10	How do rocks evolve with <b>pressure and heat</b> ? Where does <b>oil</b> come from?
7	Chapter 11	Why are their <b>earthquakes</b> , where do they occur?

		How are <b>mountains built</b> ?
8	<u>Second Exam</u> , Chapters 7-11	
9	Chapter 12, 13	How do we know <b>Earth's age</b> ? When did <b>life begin</b> on Earth?
10	Chapters 14	How is <b>Earth's climate changing and why</b> ?
11	Peak Oil	What are the <b>limits on Earth's fossil fuel</b> supply and what does that mean for society in the next few decades?
12	<u>Third Exam</u> , Chapters 12-14 and Peak Oil	
13	Chapters 16, 17	What causes <b>landslides</b> ?
14	Chapter 17,18	How do <b>rivers</b> and lakes form and change?
15	Chapter 18, 19	Why are there landslides?
16	Chapter 19, 20,	Where does our <b>fresh water</b> come from? How are our <b>coastal zones</b> changing?
	<u>Fourth Exam</u> : Final	

**Student learning objectives.** EARTH101 emphasizes objectives 1, 3, and 5.

1. Students can **explain the relevance** of geology and geophysics to human needs, including those appropriate to Hawaii, and be able to discuss issues related to geology and its impact on society and planet Earth.
2. Students can **apply technical knowledge** of relevant computer applications, laboratory methods, and field methods to solve real-world problems in geology and geophysics.
3. Students **use the scientific method** to define, critically analyze, and solve a problem in earth science.
4. Students can **reconstruct, clearly and ethically**, geological knowledge in both oral presentations and written reports.
5. Students can **evaluate, interpret, and summarize the basic principles** of geology and geophysics, including the fundamental tenets of the sub-disciplines, and their context in relationship to other core sciences, to explain complex phenomena in geology and geophysics.

## Geoscience and You

This course will provide you with a new view of the world. For the rest of your life you will carry a special perspective that only an understanding of geology can provide. A geology course can make you a better member of your community because you will understand your home planet, you will know how to avoid **natural hazards**, you will know how to sustain **natural resources**, you will understand that **global warming is real**, you will become an **informed voter**, and you will improve your **critical thinking skills**.

**Earth is the product of billions of years during which geologic processes have carved the land, mixed the seas and air, and shifted the continents—and continue to do so.**

All life on Earth is the product of **natural selection**. Preserving **biodiversity and natural habitats** is critical to the continuation of Earth's natural resources. Natural resources are geologically renewed but humans use resources faster than they can be naturally renewed. **Today humans use 1.5 Earths**; that is, the resources we use in 1 year, will take 1.5 years to replace. In the U.S. we use 5 Earths. This is not sustainable.

To ensure that heavily used resources are still here for future generations means that we must ultimately find **alternative resources**, **augment the rate of natural renewal**, or **reduce our rate of consumption** (or all the above). This can lead to **sustainability**.

Regardless of your lifework, the science of geology can provide you with a level of awareness that will serve you in your career, your personal life, and your role as a community member of planet Earth. Here are 5 "Enduring Understandings" of geology that serve as semester-long learning goals.

**1. The study of Earth encompasses a vast range of time and space.** Geologists study nature from the length of the Solar System (trillions of kilometers) to the bonding of atoms (0.0000001 centimeters). We stretch our minds to understand the megascopic to the microscopic. Massive planets are constructed of the smallest minerals. Eons of time consist of long periods of slow and gradual change punctuated by short intervals of sudden violent convulsions in nature (i.e., earthquakes, floods, landslides). This immense span of time and space is one of the fundamental characteristics of the geological sciences.

**2. Plate tectonics controls the geology of Earth's surface.** The theory of plate tectonics has far reaching implications for the organization of the planet and its history. As plates move they perpetually change the way our planet looks. Mountain ranges rise when plates collide only to be worn by erosion down to the sea. Ocean basins open and close as continents rift and collide again. Nearly every aspect of geology is related to how plates interact and change through time.

**3. Geologic systems are the product of interactions between solid Earth, oceans, atmosphere, and living organisms.** Earth is organized into overlapping *geologic systems* that influence and react to each other. Geologic systems consist of interdependent materials (such as rocks, sediments, organic compounds, and water) that interact with natural physical and chemical processes. In a broad sense, these interactions occur because solar energy, geothermal energy, and gravitational energy are at work mixing the air, ocean, and solid Earth.

**4. Change is ever present and accumulates over vast time. Humans are powerful agents of change.** You live upon an ancient and restless landscape that is changing under your feet. All forms of life have evolved partially in response to geologic change over time. Today's Earth is the product of both gradual and instantaneous change accumulating over 4.6 billion years. Hence, our planet looked very different in the past and it will look different in the future.

**5. Rocks and sediments are pages in the book of Earth history.** Geologists read the story of Earth history in the crust. Earth history teaches us that Earth is very old, that evolution is responsible for life's incredible diversity that ever-present change is a characteristic of geologic systems, and that geologic processes operate on an immense stage of time and space.

## Title IX

The University of Hawai'i is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. Staff can also direct you to resources that are in the community. Here are some of your options:

**As members of the University faculty, your instructors are required to immediately report any incident of potential sex discrimination or gender-based violence to the campus Title IX Coordinator.** Although the Title IX Coordinator and your instructors cannot guarantee confidentiality, you will still have options about how your case will be handled. Our goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.

If you wish to remain ANONYMOUS, speak with someone CONFIDENTIALLY, or would like to receive information and support in a CONFIDENTIAL setting, use the **confidential resources available here:**

<http://www.manoa.hawaii.edu/titleix/resources.html#confidential>

If you wish to directly REPORT an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support, contact: Dee Uwono Title IX Coordinator (808) 956-2299

[t9uhm@hawaii.edu](mailto:t9uhm@hawaii.edu).