Physical Geology GG101 - Fall 2009 *POST 723, Lecture MWF 9:30 ~ 10:20am*

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TEXT Essentials of Geology, 10th Ed., 2009, Lutgens, Tarbuck, and Tasa
Laboratory Manual, see GG Secretary, Susan Van Gorder, POST 701, $20
Class Lectures - **http://www.soest.hawaii.edu/coasts/lecture/gg101/index.html**

Week of	**Weekly Topic**	**Lab**
Aug. 24	Early Earth, Planet structure (Ch. 1)	Introduction
Aug. 31	Plate tectonics (Ch. 15, 16)	Maps
Sept. 7	Minerals (Ch. 2)	Minerals
Sept. 14	Igneous Rocks (Ch. 3)	Igneous Rocks
Sept. 21	Volcanoes (Ch. 4)	Lava Flows
Sept. 28	**First Exam on Wednesday Sept. 30th**	Sedimentary Rocks
Oct. 5	Weathering/Sedimentary Rocks (Ch. 5, 6)	Metamorphic Rocks
Oct. 12	Sed. Rocks; Metamorphic Rocks (Ch. 7)	Manoa Landslide
Oct. 19	Geologic Time (Ch. 18)	Geologic Time/Structural
Oct. 26	Structural Geology (Ch. 17)	Fossils
Nov. 2	Earthquakes (Ch. 14)	Earthquakes
Nov. 9	**Second Exam on Monday Nov. 9th**	Stream Flow
Nov. 16	Climate change	Ground Water
Nov. 23	Coastal geology (Ch. 13)	No Lab
Nov. 30	Groundwater, surface water (Ch. 9, 10)	Beach Profile
Dec. 7	**Third Exam on Wednesday December 9th**	Coastal Processes

Grading - Three exams worth 70% of your grade, in-class assignments worth 25%, attendance and participation worth 5%. Unless you call or email ahead of class, no late assignments will be accepted.

The **Department of Geology and Geophysics** has established the following undergraduate student learning objectives. Keep especially objectives 1, 3, and 5 in mind as overarching targets of our curriculum in GG101.

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.

Some Goals for You

This geology 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 geology can teach:

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.

You will also understand that life around you is the product of natural selection and that preserving biodiversity is key to continuation of Planet Earth's living treasures. You will appreciate that Earth's resources are naturally renewed, but at rates that are usually greatly outpaced by human usage. To ensure that heavily used resources are still here for our grandchildren means that society ultimately must find alternative resources, augment the rate of natural renewal, or reduce our rate of consumption (or all the above). This is called *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 (billions of kilometers) to the bonding of atoms (0.00000001 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 past events in the crust and piece together the history of the restless planet. These materials teach 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.