**GEOL 1010-004**
*Introduction to Physical Geology*
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Office Hours: 11-12 AM Wed

**GEOL 1010-004 - 2014**
- **Web Site:**  
  - http://ruby.colorado.edu/~smyth/G1010syl.html
- **Text:**  
  - *Understanding Earth* Sixth Edition (Grotzinger, Jordan,) 2010 (~$100)  
- **I-Clicker**

**GEOL 1010-004 - 2014**
- **Test Policy**
  - Four hour-exams
  - Cumulative clicker scores.
  - We will take the best four out of five scores.

**GEOL 1010-004**
- **Web Site:**  
  - http://ruby.colorado.edu/~smyth/G1010syl.html
- **You can download and print the lecture power points and use them to take notes.**
- **Read the book chapters: Lectures follow the book chapter sequence.**

**GEOL 1010-004 - 2014**
- **Test Dates (Tentative):**
  - Test 1 February 10 (Mon)
  - Test 2 March 7 (Fri)
  - Test 3 April 11 (Fri)
  - Test 4 May 2 (Fri)
- **Clicker scores (includes homework)**  
  - Best four out of five
Physical Geology:
Learning Goals (Intro)
• The scientific method (four steps)
  – 1. Observation, 2. Hypothesis,
• What is Physical Geology?
  – Surface Processes
  – Interior processes
• Earth Structure (Crust, mantle, core)
• Geologic Time
  – 4.55 Billion years of Earth History

Earth Processes
• External Heat Engine
  – Thermonuclear Fusion in Sun
  – Drives most surface processes
    (atmosphere and ocean circulation,
    weathering, and sedimentation)
• Internal Heat Engine
  – Radioactive decay of U, Th, and K
  – Drives internal processes (volcanoes,
    earthquakes, plate movement,
    magnetic field)

Physical Geology
• Study of the Earth
  – How it Formed
  – How it evolved
  – Surface Processes (Sun)
  – Interior Processes (U, Th, K)
  – How to preserve and utilize its
    resources

Assignment
Read Grotzinger Chapter 1

Physical Geology
• Field Science
  – Descriptive of the Earth
  – Observations and Hypotheses are
    based in Field
• Laboratory Science
  – Analysis of samples
  – Experiments to explore and test
    hypotheses
Earth is made up of crust, mantle, and core

What percentage of the total planet mass is

The oceans? 0.025%
The crust? 0.5%
The mantle? 66%
The core? 33%

The crust and mantle are solid silicate rock.

The crust is divided into plates (~13).

The plates move around. (a few cm/y)

Plate movement is driven by thermal convection in the solid mantle.
The Crust: Ocean and Continent

Less dense continental crust floats on denser mantle.

The Earth appears to be about 4.5 billion years old.

Multi-celled organisms that have left fossils appear to have evolved rapidly in the early Phanerozoic which began about 542 million years ago.

About what percentage of total Earth history is the Phanerozoic? 550/4550 =
The Earth appears to be about 4.55 billion years old.

Multi-celled organisms that have left fossils appear to have evolved rapidly in the early Phanerozoic which began about 542 million years ago.

About what percentage of total Earth history is the Phanerozoic? ~15%

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How do we know this?

1. Relative time scale of sediments
2. Radiometric 'clocks in rocks' (igneous)
3. Radiometric dating of meteorites
Interactions at plate boundaries depend on the direction of relative plate motion and the type of crust.

Which kind of plate boundary is associated with Earthquake activity?

A. Divergent Boundary  
B. Convergent Boundary  
C. Transform-fault Boundary  
D. All of the above

At which kind of plate boundary is new oceanic lithosphere formed?

A. Oceanic transform boundary  
B. Oceanic divergent boundary  
C. Ocean-ocean convergent boundary  
D. Ocean-continent convergent boundary