

GEOL 10: Environmental Geology

Mid-Term I Study Guide

Scientific Method

What are the steps of the scientific method? What is the difference between a theory, an hypothesis, and a law? What is an example of the scientific method?

The Earth

How can we determine the top of the atmosphere? What are the two ways to classify the layers of the Earth (what groups of scientists have done this)? What are the layers of Earth (provide both ways/categories)? What is the difference between a closed and an open system?

Geologic Time

What are the two kinds of geologic time? What is the basis for each? What is the principle of superposition? What is the principle of original horizontality? What is the principle of cross cutting relations? What is the principle of lateral continuity? What are the three types of unconformities (describe how they are different: if you can describe them, this is as important as knowing their names)? What is a half-life? What is the difference between a parent and a daughter isotope? What is the difference between atoms, isotopes, and ions (e.g. how are these three particles defined)? After 4 half-lives have passed, what percent of the parent isotope remains? Given a half-life of 5730 years, after 3 half-lives of time, how many years have passed? What are some assumptions (3 or 4) that we make when we use radioactive decay for age control?

Earth Materials

What is a mineral? What are the ways that we can distinguish between minerals (list the optical and material strength properties)? What is a rock? What are the 3 kinds of rocks? How are each of the three types of rocks formed (what is their origin; what processes lead to their formation; what are the factors that control the formation of different rocks in each of these 3 rock types)? What is the difference between intrusive and extrusive rocks? What is another name for intrusive and extrusive rocks? List the main ways to classify each of the three types of rocks (list 2-3 ways that rocks are classified in each rock type). How does the percent silica (4-sided dice) affect rocks? List intrusive and extrusive rocks, ranked from low to high silica content. Why/How does silica content control lava/magma behavior and volcano shape? How is coal formed?

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Plate Tectonics

Describe the process of thermal convection (cooking ramen or in the mantle). How do we know where the plate boundaries are? Why are the continents sticking above sea level (in other words, why does oceanic crust stay below sea level); think about the next question when you answer this one? What is more dense, oceanic or continental crust? Why? What are the three types of plate boundaries (and describe them)? Why does oceanic crust subduct beneath continental crust and not the other way around? What are some of the evidences for continental drift? How is "rate" defined (e.g. plate motion rate)? What are magnetic anomalies and how are they formed? How can magnetic anomalies tell us about plate motions? How can hot spots provide us with plate motion rates? Can you calculate a plate motion rate from either hot spot or spreading ridge measurements? Why is younger oceanic crust shallower and older oceanic crust deeper in the ocean? What are some examples of the different types of plate boundaries? What evidence do we have for earthquakes and tsunamis along the plate boundary along the coast of northern California, Oregon, and Washington? How does a ghost forest form? How can we use an offset stream channel to calculate a plate motion rate?

Earthquake Faults

What is stress? What is strain? Are stress and strain proportional to each other? What are the different types of earthquake faults? What are the types of stress and strain that lead to these different fault types? How can we get compression or extension along a shear type of fault? Match the different fault types with the plate boundary types that we might expect to find them associated with.

Seismology

What are the two main types of seismic waves? What are the for seismic wave types? Can you identify the different kinds of motion for each seismic wave? Which is the fastest wave type? Which is the second fastest? (Because we are still working on seismology, we will only cover some of this material on the mid-term.)