Earth Science Final Exam Study Guide

Journey to the center of the Earth (Chapter 2)

- Earth's magnetic field
  - Protects earth's surface from harmful solar wind
  - deflection = aurora borealis
- Earth's composition overall
  - Iron, oxygen mainly then silicon, magnesium, etc
- Earth's crust composition
  - Oxygen and silicon mainly

Plate Tectonics (Chapter 3 and 4)

- Distinction between crust and mantle
  - Chemical makeup
- asthenosphere vs. lithosphere
  - Physical makeup (rigidity bc temp)
  - L: crust and upper mantle, rigid
  - A: plastic
- Number of plates: 15-20
- types of plate boundaries
  - by earthquakes
  - active and passive
  - divergent: MOR
  - convergent: Subduction
  - transform:
    - oceanic: fault occurs with MOR not after
    - Junctions
- how plates interact at boundaries
  -
- Subduction
  - Old oceanic more dense so sinks under asthenosphere
  - Wadati-benioff zone
  - Ocean crust not as old as continental bc of it
  - Causes volcanic arcs
  - Continental can't be subducted bc too buoyant
  - down going plates melt and produce magma which rises to the surface and leads to volcanoes.

- Sea-floor spreading
    - Upwelling mantle erupts at MOR
    - New crust moves away
    - Ocean crust sinks beneath continent with contact

Minerals and Rock Groups (Chapter 5)

- Most abundant class of minerals
    - Silicate minerals
- Three types of rocks, order of most abundance
    - Igneous
        - Cooling and consolidation of magma
    - Metamorphic
        - Igneous or sedimentary that changed bc high temperature/pressure
    - Sedimentary
        - Chemical precipitation of material from water at surface or by deposition and cementation of particles and debris transported by water/wind/ice

Igneous Rocks (Chapter 6)

- Mafic vs. felsic
    - Felsic: more silica than mafic
    - Mantle is more mafic than crust
    - Increase silica, increase viscosity (resistance to flow)
- Higher silica = higher viscosity = slower flow
    - Rhyolitic
    - Gabbro: intrusive, cools slow, large grain
- lower silica = Higher temperature = lower viscosity = higher gas content
    - basaltic: extrusive, cools quick, crystals, fine grain
- Geothermal gradient
    - Temperature increases with depth
- Categorization of intrusive magma:
    - Tabular bodies: traced laterally, uniform thickness
        - Dikes: crosscuts rock
        - Sills: parallel to rock
    - Plutons: large, deep igneous body disrupting bedding bc rise of magma

Metamorphic Rocks (Chapter 8)

- Metamorphism occurs in solid state: not including weathering or melting
- Four agents of metamorphism

    - Heat, pressure, differential stress, hydrothermal fluids
    - Not all required, often co-occur
- Contact metamorphism:
    - Rocks heated and chemically changed by the intrusting of a body of hot magma

Sedimentary (Chapter 10)

- Types of sedimentary rock
    - Clastic: solid fragments and grains cemented together
    - Biochemical: consist of shells of organisms
    - Organic: consist of carbon –rich remnants of plants
    - Chemical: made from minerals precipitated directly from water
- Sandstone & shale
    - Sandstone: clastic rock, sand size particles, often deposited in beaches
        - Quartz most common
    - Shale: clay size, quiet water environments, organic rich source of natural gas
- Transgression & regression
    - Transgression: Flooding due to sea level rise
    - Regression: Exposure due to sea level fall

Volcanoes (Chapter 9)

- Shield: broad
    - slightly dome-shaped, basaltic lava
- cinder cone:
    - conical piles of tephra
- stratovolcanoes
    - composite
    - large cone-shaped
    - alternating layers of lava and tephra
    - most common for explosiveness and feslic lava
- eruptive styles and connection to magma type and viscosity
    - basaltic: mafic lava, very hot, low silica, low viscosity, thin and fluid, flow fast and farther
    - andesitic: viscous, slow flow, mound around vent
    - rhyolitic: most viscous, rarely flow, cause pressure and volcano explodes
    - effusive eruptions: produce lava flow, commonly basaltic..create shield
    - explosive eruptions: produce pyroclastic flows, andesitic or rhyolitic, form strato