Midterm Study Guide - Historical Geology

Chapter 1-3: Intro to Earth History
Nicolaus Steno: Superposition, Original Horizontality, Lateral Continuity
James Hutton: Uniformitarianism, Geologic Time
Charles Lyell: Cross-cutting Relationships, Inclusions
William Smith: Biological Succession
Geologic Time Scale: Eon, Era, Period, Epoch
Relative and Absolute Age Dating Methods
Isotopic Age Dating: U-Pb, K-Ar, Rb-Sr, C-14, Fission Track

Chapter 4: Earth Materials
Minerals and Rocks
Common Igneous Rock Forming Minerals: Quartz, feldspars, micas, ferromags (incl. olivine)
Sedimentary Rock Forming Minerals: Clay, quartz, calcite, gypsum, halite, dolomite
Rock Cycle: Igneous (volcanic and plutonic), Sedimentary, Metamorphic
Igneous: Basalt, andesite, rhyolite, gabbro, diorite, granite, peridotite
Sedimentary: elastic, chemical, biogenic
Metamorphic: foliated and non-foliated

Chapter 5: The Sedimentary Archives
Environments of Deposition: Marine, Transitional, Terrestrial
Meaning of color in sedimentary rocks
Texture of SedRx: Grain size, Angularity, Sorting, Maturity
Sedimentary Structures: Paleocurrent Indicators, Geopetal Indicators, Environmental Indicators
Formation, Member, Group
Transgression (onlap sequence); Regression (offlap sequence)
Facies
Correlation Methods
Unconformities: Nonconformity, Angular Unconformity, Disconformity
Geologic Column, Cross-Section, Geologic Maps
Paleogeographic map, Lithofacies map

Chapter 6: The Fossil Record
Bias and incompleteness of the fossil record
Requirements for fossilization: hard parts and quick burial
Mode of fossilization: unaltered, permineralization, replacement, recrystallization, cast/mold, trace, carbonization
Use of Index Fossils and fossil assemblages in age dating and correlation
Use of fossils as environmental indicators: endemic and cosmopolitan species
Nektonic, planktonic and benthic life forms (infaunal and epifaunal)
Littoral, sublittoral, neritic, pelagic, abyssal environments
Marine ecosystems and food chain (paleoecology)
Linnaean System of Classification: Definition of genus and species
**Organic Evolution:**
Lamarkian evolution
Darwinian: Evolution by natural selection
   1. Too many young  2. Natural variations  3. Best adaptations tend to survive
Mendelian genetics and mutations as source of variation
Phyletic Gradualism and Punctuated Equilibrium
Evidence concerning Evolution:
   Biologic succession, branching organization of life (incl DNA), homology (use of same feature for different purposes, analogous structure (use of different features for same purpose), vestigial organs and structures, biogeography, currently observed evolution, transitional species and the fossil record.
Patterns of Evolution:
   Divergent, convergent, iterative
Adaptive Radiation: birds in Galapagos and Hawaii, mammals after the dinosaurs died out
Micro-, macro-, and megaevolution
Creation-Science

**Chapter 7: Earth Structure and Plate Tectonics**
Divisions of the Interior of the Earth:
   Core(Inner and Outer), Mantle, Crust (Oceanic, Continental)
   Asthenosphere and lithosphere
Crustal Structures:
   Faults (normal, reverse, strike-slip), Folds (anticline and syncline)
Plate Tectonics:
   Evidence: Fit of continents, rock and structure similarities, fossil evidence, paleoclimates, Paleomagnetism (apparent polar wandering, polar reversals), Age and thickness of sediments on the seafloor, satellite measurements
Boundaries:
   Divergence: Oceanic and Continental
   Convergence: Ocean to ocean, ocean to continent, continent to continent
   Accretionary wedge, forearc basin, magmatic arc
   Transform
Hot Spots
Exotic Terranes