Astronomy 141 -- Winter 2012
Quiz 1 Study Guide

Unit 1: Introduction

Astronomical Numbers
- Scientific Notation
- Metric system
- The AU, Light Year, Earth Mass and Solar Mass
- The micron and nanometer

Unit 2: Five Revolutions

The Copernican Revolution
- Motions of the Stars, Sun, Moon, and Planets
- Retrograde Motion of the Planets
- Geocentric Models of the Solar System
  - Epicycles – why needed
- Heliocentric Models of the Solar System
  - How does it explain retrograde motion
- Contributions of Copernicus, Kepler and Galileo
- Galileo's telescope observations & their significance
  - The Moon, Sunspots, Phases of Venus, Moons of Jupiter

The Chemical Revolution and the Nature of Matter
- Classical Elements (Earth, Air, Fire & Water)
- The Atomists vs. the Aristotelians
- Contributions of Lavoisier and Dalton
- Periodic Table of the Elements
- Constituents of Atoms:
  - Nucleus of Protons & Neutrons
  - Orbiting Electrons
- Chemical Elements
  - Atomic Number (number of protons)
  - Isotopes
- Radioactive Decay and Half-Life

The Geological Revolution and the Age of the Earth
- Historical versus Physical Ages
- Radioactive half-life
- Radioactive Isotope Dating (radiometric dating)
  - The age of a rock is the time since it solidified
- Problems finding the oldest rocks
- What is the age of the Earth? What data are used?

The Biological Revolution
- Idea of Spontaneous Generation and its persistence
- Discoveries with the microscope
- Mendel's discovery of the laws of heredity
- Understanding of the workings of heredity in cells
- Discovery of DNA as the agency of heredity

The Cosmological Revolution
- The number, location and types of planets in the Solar System
- The nearest stars
- What are the basic properties of the Milky Way?
- What are galaxies?
- Clusters and Superclusters of Galaxies
- What is the current value for the age of the Universe?
- What is the origin of the chemical elements?
- What are the most abundance elements in the Universe?

Unit 3: Life on Earth (Part I)

Inside the Earth
- Seismology as a probe of the Earth's interior
- P- and S-waves
- Location and composition of the different layers
  - Solid Inner Core, Molten Outer Core, Mantle, Crust
- Differentiation
- Origin of Earth's Magnetic Field
- Plate Tectonics
- Types of plate boundaries
  - Transform Boundaries (lateral motions, transverse faults)
  - Convergent Boundaries (plates colliding, subduction, crust buckling)
  - Divergent Boundaries (mid-ocean ridges)

The Earth's Atmosphere
- Composition of the present atmosphere
- Primordial (ancient) atmosphere
- Origin of the atmosphere in volcanic outgassing
- Origin of oxygen in the atmosphere
- Where is the water and carbon dioxide now?
- Why is Nitrogen the most abundant constituent of the present-day atmosphere
- Greenhouse Effect (causes & manifestation, importance
  - in determining the Earth's surface temperature)
- Atmosphere evolution

The Geologic History of the Earth
- Types of Rock (metamorphic, igneous, sedimentary)
- Stratigraphic vs. Radiometric ages
- Major Eons (Hadean, Archaean, Proterozoic, & Phanerozoic)
- Hadean Earth: Moon Formation, Atmosphere & Ocean Formation
  - Epoch of Heavy Bombardment

Climate Regulation and Climate Change
- History of the Earth's Atmosphere
- Carbon Dioxide Thermostat
- Ice Ages and the Malenkovich Cycles
- Snowball Earth
- Modern Climate Change