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 abundant 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