Astronomy 141 -- Winter Quarter 2012
In-Class Quiz 3 Study Guide

General Solar System
- Names of the 8 planets
- Dwarf Planets (know the names of the 5 recognized dwarf planets)
- Order of planets in the Solar System
- Terrestrial Planets (know names, basic composition, order in solar system)
- Jovian Planets (Gas Giants, Ice Giants, know names, basic composition, and order within the solar system)
- Giant Moons (where are they found? what are they made of?)
- Asteroid and Meteoroids (composition, where found)
- Trans-Neptunian Objects (composition, where found)
- Comets (composition, where found)

Comparison of the Terrestrial Planets
- Interiors & Surfaces (differences & similarities)
  - Cratering is a way to determine terrain ages
  - Relation of tectonism to internal heat
  - What are the forces that shape the different surfaces?
  - What are primary, secondary, and tertiary crusts?
  - Which kinds of tectonic activity occurred on which planets?
- Origin & evolution of terrestrial planet atmospheres
  - Probably started with similar compositions & evolved very differently
  - What is the role of the Greenhouse effect in atmosphere evolution
  - What is a "Runaway Greenhouse Effect", example: on Venus
- Atmosphere Retention
  - What is it? What factors determine a planet's ability to retain an atmosphere?
- What factors drive atmosphere evolution?

The Jovian Planets
- Gas Giants: Jupiter and Saturn
- Ice Giants: Uranus and Neptune
- What is their atmosphere composition?
- What is internal structure?
- Which have sources of internal heat?
- What are Reducing Atmospheres?
- What molecules are common in reducing atmospheres?
- Why do the Jovian Planets have heavy H/He atmosphere?
- Giant Moon systems (which have giant moons?)

Requirements for Life
- Sources of Energy for life
- Requirement of complex (carbon?) chemistry
- What are different possible alternatives to water as a solvent medium?
- What role does protection from harmful UV radiation play in life?
- Sunlight and other sources of energy
- Extremophiles and their lessons for life's requirements
- What is the role of a planet's size in determining habitability (internal heat, magnetic fields, atmosphere retention)

Mars
- Martian Atmosphere
  - basic composition (most CO_2 and N_2, traces of H_2O)
  - Pressure & Temperature typical of Mars' surface?
  - Dust storms on Mars
  - How did it get that way?
- Martian Surface Features
  - plains & cratered highlands
  - volcanoes (Olympus Mons & Tharsis Region)
  - canyons & channels
  - polar caps
- Evidence for liquid water in Mars' past

Life on Mars
- Martian Canals - what were they?
- Problem of water on Mars (too low pressure for stable liquid water)
- Viking Landers and their biological test results
- ALH84001 Martian Meteorite controversy
- Methane in Mars' atmosphere (short life, possible sources of methane?)
- Discoveries by the Phoenix Lander (water ice, light snow, calcium carbonate, perchlorate salts)
- Goals of future missions to Mars

Galilean Moons of Jupiter
- What are the names of the 4 Galilean Moons?
- What are their basic properties and compositions?
- Interior of Ganymede & Callisto
- Tidal Heating - interior heat determined by proximity to Jupiter, not size
- Volcanoes on Io
- Ice on Europa
- What are the arguments for liquid water oceans beneath Europa's ice?
- What are the arguments for why Europa is a likely place to find life?

The Children of Saturn
- Enceladus
  - Water fountains and cryovolcanism
  - Tidal heating driving cryovolcanism
  - Ices from Enceladus build the E ring
  - Possibility of liquid water and life (source of heat?)
- Titan - the large moon of Saturn
  - Thick Nitrogen & Methane atmosphere
  - Only Solar System moon with a heavy atmosphere
  - Methane plays role of Water on Titan
  - Has an atmosphere because it is so cold
  - Titan as example of prebiotic conditions

Goldilocks and the Three Planets
- Why is Mars so dry and cold?
- Why is Venus so dry and hot? Runaway greenhouse effect
- Why are conditions on Earth so ideal for life?
- How does a planet's size affect its habitability
- What is the definition of the Habitable Zone?
- Where is the Habitable Zone now in the Solar System?
- What is the role of the Sun's brightness in determining the the location of the habitable zone?
- What is the Continuously Habitable Zone?