Introductory Astronomy I : Study Guide for Exam #3

The 3rd mid-term exam for ASTR 129 will be held on Wednesday, 30 November in class. It will consist of approximately 50 multiple-choice (and possibly some matching) questions covering chapters 9, 10, 11, 12, and 14 (except where noted below). You should also review the material about the terrestrial and jovian planets in Chapters 7 and 8.

Chapter 9: The Living Earth

Earth's Interior:

Layers of the Earth's interior (inner core, outer core, mantle, crust). What is each layer composed of? Is it solid or liquid? How can we "probe" the interior? What do we mean when we say a planet is "differentiated"? Though I won't ask about the magnetosphere itself, I will ask you to understand what the presence of a magnetic field can tell us about the interior. Understand the difference between conduction, convection, and radiation of heat and where they are important throughout the Earth's interior and surface layers.

Earth's Surface:

What are the differences between oceanic and continental crust (study this in detail)? What is the fundamental cause of geological activity? How does geological activity manifest itself (e.g., continental drift, volcanoes, earthquakes, mountain building)? Study the different types of *boundaries* between crustal plates, know what sort of geological activity is associated with each, and be able to cite a real example or two of each.

Earth's Atmosphere, Hydrosphere, and Biosphere:

What are the sources and sinks of atmospheric gas? What interactions between the Earth's various systems keeps the sources in balance with the sinks? What would our atmosphere be like in the absence of photo-synthetic life on Earth (also see Section 11.7)? What cases the Greenhouse effect? What would Earth be like without a greenhouse effect? Be familiar with a few examples of measured, recent changes in the atmosphere and climate. Be familiar with a few examples of human effects on atmosphere or climate on top of Earth's natural cycles.

No questions on: Sedimentary and metamorphic rocks. "Cycle of supercontinents' in 9-3. Section 9-4. 'Upper layers of atmosphere', except stratosphere and ozone layer, in 9-6. Fig 9-24.

Chapter 10: Our Barren Moon

Why doesn't the Moon have a permanent atmosphere (gravity only 1/6 that of the Earth)? What are the differences between lunar highlands and maria (composition, age, % of surface, etc)? Why are there more craters on the Moon than on the Earth? Why are impact craters usually round? How can impact craters be used to determine the age of a planetary surface? What can we learn by studying the distribution of crater sizes? What can we learn by comparing the density of craters (number per square kilometer on the surface) in the highlands and in the maria? How do we know that impacts were far more frequent 3.5 to 4 billion years ago than they are now? What is our best current theory for how the Moon was formed; when did that happen? What causes mountains to form on the Moon? What kinds of elements and compounds are found in Moon rocks? Which kinds are not found? What is a "breccia"? a basalt?

No questions on: Box 10-1, libration (in Section 10-1 and Fig10-2), names of or results from lunar missions other than the Apollo program (in Section 10-2), "the origin of moonquakes" in Section 10-3, "the receding Moon"(in Section 10-5)

Chapter 11: Mercury, Venus, and Mars: Earthlike Yet Unique

Mercury

No specific questions about Mercury. Just be familiar with its basic properties (size, density, etc.) compared to the other terrestrial planets. We have a spacecraft orbiting Mercury now, and we will be learning a lot about it over the next few years. Stay tuned.

Venus

You should have a feel for how its global properties compare with the other terrestrial planets (especially Earth): mean density, diameter, albedo (75%), surface temperature (750 K), and atmospheric pressure (90 times that of Earth). Why are these last 3 properties so different from those of the Earth? How does the atmosphere of Venus differ from that of the Earth? What are the critical steps involved in the "runaway greenhouse effect" that could be responsible for the high surface temperature on Venus? How do the craters on Venus differ from those on other planets and the Moon (no small ones, all are nearly pristine)? How does the crater density on the surface tell us that the entire surface is only a few hundred million years old? Why is the surface so "young"? How does volcanic activity on Venus differ from that on the Earth and Mars?

Mars

What are the overall "geographic" properties of Mars (e.g. polar caps, Tharsis bulge, giant shield volcanoes, runoff channels, overflow channels, cratered highlands, low-lying plains, wind-blown dust)? How does the atmosphere of Mars differ from that of Earth and Venus? Although both Venus and Mars have atmospheres made almost entirely of Carbon Dioxide, Mars doesn't have a major "greenhouse effect"; why not? What is the "evidence" that liquid water once flowed on the surface of Mars? How do the northern and southern hemispheres of Mars differ from each other? Why are the mountains so tall on Mars? Which properties of Mars make it the most likely place to find evidence for past (or even current) life? Has any direct evidence been found?

No questions on 11.1 and 11.2 (but you should know the rotational and orbital periods, the inclination of Mars' rotational axis, and why these numbers matter; you should also study the other global properties of the planets, particularly their densities, masses, and surface temperatures). No questions on'Sspeculations about Venus' or 'Speculations about Mars' subsections of Section 11-4, or about 'Convection in the Venusian Atmosphere' in 11-6. No questions on section 11-3, 11-8 (except points covered explicitly in class notes), 11-9.

Chapter 12: Jupiter and Saturn: Lords of the Planets
Chapter 14: Uranus, Neptune, Pluto and the Kuiper Belt: Remote Worlds

Study the basic properties of the 4 planets (tables 12-1, 12-2, 14-1, 14-2 plus a review of what Chapter 7 has to say about the Jovian planets). We will focus primarily on their rapid rotation, the activity in their clouds, and their internal structures.

No questions on 'Differential Rotation' in 12-2, 'Radiating Energy into Space' in 12-4, 'A convection paradox' in 12-4. No questions on 12-7 through 12-1.1 No questions on 14-1 and 14-4 through 14-10.