

Exam #2: Study Guide
ASTR 129-003 and 129-004 (Astronomy I)

The second exam will be held during the normal class hours on **Wednesday, 26 October 2011**. It will consist of about 50 multiple-choice (and possibly some matching) questions. The exam will cover all of the material in sections 4-5 through 4-8, and chapters 7, 8, 15, & 16 (except where noted below).

Chapter 4: Gravitation and the Waltz of the Planets

- Galileo's early telescope observations and his experiments with motion revolutionized science. What did he observe that nobody had seen before?
- What are Newton's 3 laws of motion? What do they apply to, and what do they mean? What is a force? mass? acceleration?
- What is Newton's Law of gravity (force depends on what? which direction does the force cause things to accelerate?). What's the difference between mass and weight?
- Understand how orbits work (we spent a lot of time on this). Earth rotates at 0.5 km/s at the equator. The minimum orbital velocity is about 8 km/s. What happens if you try to launch into an orbit slower or faster than this speed? Why are astronauts more accurately described to be "in freefall" rather than "weightless" or "zero gravity"? Earth orbits the sun in close to a circular orbit at 30 km/s. What would happen if Earth moved faster or slower than this? Would our orbit be different if Earth was twice as massive?
- Kepler's 3rd law becomes even more important with Newton's laws of motion and gravity. Review Box 4-4. The important thing is that we can determine mass by measuring the period and semi-major axis of a satellite's orbit (you used this in lab to calculate the mass of the Moon).
- What causes tides on Earth? How can we predict the times and levels of high and low tides? What are "neap" tides and "spring" tides?
- No questions on: Sections 4-1 through 4-4 (these were covered on the first exam).

Chapter 7: Comparative Planetology I: Our Solar System

- Know the names of the 8 planets in order from the Sun. Which planets are at the extreme values in size, mass, density, etc. ?
- How do we measure MASS and SIZE of planets? How do we compute their DENSITY?
- How are the Terrestrial planets similar to each other, and how are they different from the Jovian planets? Be able to compare/contrast their properties in terms of the Earth's (Table 7-1)
- No questions on 7-3, 7-6, 7-7, Box 7-2

Chapter 8: Comparative Planetology II: The Origin of Our Solar System

- What were the 5 main elements comprising the pre-solar nebula, and what were the relative amounts (e.g. mostly hydrogen and helium; what percentage of the others)?
- Why does a rotating, collapsing cloud form a disk?
- Why do all the planets orbit the Sun in more or less the same direction the same plane?
- What is accretion, and why did collisions of planetesimals tend to accrete into larger planets rather than blasting each other into smaller fragments?
- The inner part of the proto-planetary disk was too hot for light elements to condense out of the gas. See figure 8-10.

- How does this "model" explain the basic features of the current solar system (i.e. the orbits; the differences between terrestrial and jovian planets)?
- You should know how radioactive dating is used to estimate the ages of rocks, and therefore to derive a lower limit to the age of a planet. You should know the ages of the oldest rocks as well as the generally accepted value of 4.6 billion years for the age of the solar system.
- No questions on 8-7.

Chapter 16: Our Star, The Sun

- How do we measure the global properties of the Sun (see Table 16-1): size, distance, temperature, density, rotation rate, luminosity? How big is it? how massive is it? (compared to the Earth)
- What is the temperature at the photospheric "surface" of the Sun? What is the temperature in the core? What is the temperature in the corona?
- What is a fusion reaction? How does it "create" energy? What is "fused" into what? What physical conditions are required to begin and to sustain fusion reactions?
- All stars are in a critical balance between the forces trying to blow them apart and gravity trying to hold it all together. The star adjusts itself (puffs up or contracts) until it achieves this balance (called "hydrostatic equilibrium").
- What is the *cause* of magnetic activity? Be able to recognize a few forms of activity: spots, plages, flares, prominences, coronal mass ejections, etc. How does it affect us at the Earth?
- No questions on: details of solar models (e.g. Table 16-2; Figure 16-3); details of experiments described in Section 16-4 (but know that fewer neutrinos are observed than we expected); spicules in Section 16-6 and Figure 16-12; the magnetic dynamo model in Section 16-9; magnetic reconnection in Section 16-10

Chapter 15: Vagabonds of the Solar System

- read Section 14-10 about Pluto and the Kuiper belt
 - What is a meteor? meteorite? meteoroid? asteroid? comet? meteor shower?
 - Why are these small bodies and "debris" important to us? (impacts affect evolution of a planet and life on a planet; debris that has impacted the Earth is available for us to study in our laboratory; the debris tends to be the oldest material in the solar system, so it helps us to probe of the formation of the solar system).
 - What are asteroids composed of? What are comets composed of?
 - Why do we think the solar system is surrounded by an "Oort cloud" and a "Kuiper belt" of comets? What are their properties (shape, size, # of objects; distance from Sun)
 - Properties of meteorites (e.g. what are the 3 classes made of, how do they relate to asteroids).
 - meteorite Falls v. Finds.
 - No questions on 1st part of 15-1 (Hunt for the "Missing Planet"), but read the part about Ceres; Section 15-2
-