ASTR 129-003 & 004 (Astronomy I)
Exam #1: Study Guide

The first exam will be held during the normal class hours on **Wednesday, 21 September 2011**. It will consist of about 50 multiple-choice questions. I am trying to test your *conceptual understanding*, not your ability to calculate numbers or memorize facts. The exam will cover MUCH of the material chapters 1-4 of the textbook and ALL of the material from the lectures. You should also have been working hard in lab to get a better conceptual understanding of the material presented in class and in the book, so it would pay to review that material too. The on-line "recommended activities" are not graded, but they will help you answer several questions on the test.

Make sure you read all of the material in the chapters, including the chapter summaries. There are questions at the end of each chapter that will help you review, and there are study materials available on textbook's website. I will indicate some sections that I will not be asking questions about on the exam. However, you should still read these to help you understand material in the other sections. You should also make sure you understand what you did (right or wrong) on the "pre-quizzes". Studying with a colleague is very helpful.

Chapter 1: Astronomy and the Universe

- Why do we measure locations and distances on the sky using ANGLES? What is a degree, arc-minute, and arc-second? What is the angular size of the moon and the sun?
- Box 1-1 introduces the small-angle formula. You won't have to work out numbers, but you should know that the apparent angular size depends on how big something is and how far away it is. You should also know what "proportional" means. For example, if apparent angular size is proportional to true size, then doubling the true size also doubles the apparent angular size. If apparent angular size is inversely proportional to the distance, then doubling the distance cuts the apparent angular size in half.
- If you are not familiar with powers of 10 ("scientific notation"), you should study section 1-6. You won't be doing calculations on the exam (like those in Box 1-2), but you should recognize what a number written in scientific notation means.
- Why are *units* important in discussing scientific results? Read Box 1-3. Again, there won't be calculations, but you need to recognize different units; some answers may have the same numerical value but different units, for example.
- No questions on: 1-1, 1-2, 1-3, 1-4, 1-7, 1-8

Chapter 2: Knowing the Heavens

- The textbook only briefly covers most of the important material. Class notes and your experience in lab are critical to understanding Chapter 2. You have to be able to shift your perspective around to understand how the celestial globe works as a "model" of the sky.
- What are "azimuth" and "altitude"? How are they measured? With respect to what? What is the maximum and minimum value they may have? Know the azimuth and altitude of key parts of the celestial sphere (e.g. celestial equator, celestial poles, zenith) when viewed from Charleston, the North (and South) poles, the equator, and a point in the southern hemisphere.
- The celestial sphere is marked with a grid analogous to lines of latitude and longitude on the Earth. You should have a clear idea of this "declination - right ascension" grid. For example,

declination is 0 at the equator, +90 at the north celestial pole, -90 at the south celestial pole; there are 24 "hour" circles of right ascension, spaced 15 degrees apart, that intersect at the north and south celestial poles.

- You should know everything about the daily motion of the sky: how things move (east to west in circular paths centered on the celestial poles). You should also be able to describe how these motions appear to a person on the Earth's poles, equator, and in Charleston.
- What is tipped by 23.5 degrees? Tipped compared to what? How does this cause seasons? How does the motion of the Sun in the sky differ in summer and winter? What is the azimuth of sunrise and sunset at different times of year? What is the altitude of the noontime sun at different times of year? What is the length of the day (sunrise to sunset) for different times of year? Why do all of these numbers depend on where you are located on the Earth?

Chapter 3: Eclipses and the Motion of the Moon

- The Moon rotates once and circles the Earth once every 27.3 days. Because the Earth is also moving around the Sun, the moon completes a cycle of phases every 29.5 days. The Moon moves eastward by about 12 or 13 degrees each day with respect to the stars, causing it to rise about 50 minutes later each day. You should understand why this happens.
- Be able to recognize any phase of the Moon and figure out what time of day you can and cannot see it. Become intimately familiar with either Figure 3-2 or the figure I passed out in class. What's the difference between the "waxing" and "waning"?
- What are solar and lunar eclipses, and when can we see them? Where do you have to be on Earth to observe one if it happens? Why don't we see them every month? About how often do they occur? Why is the "umbra" shadow darker than the "penumbra"? What's the difference between a "partial" eclipse and a "total" eclipse? What is the phase of the Moon just before a solar eclipse? just before a lunar eclipse?
- How were ancient astronomers able to determine that the Earth is spherical?
- No questions on: Box 3-2

Chapter 4: Gravitation and the Waltz of the Planets (first part of chapter)

- How do Mercury and Venus appear to move when viewed from Earth? Mars, Jupiter, and Saturn? What is a "retrograde" loop?
- What observations of the planets' apparent motions are difficult or impossible to explain with *Geocentric* models? (e.g. retrograde motion, variable brightness, Venus and Mercury always near Sun)
- What is the *Heliocentric* model of the solar system, and what early observations "confirmed" it or led to its general acceptance (e.g. phases of Venus, retrograde motion, satellites of Jupiter, craters on the moon).
- You should understand the context of how our current understanding of the solar system developed, especially the role that accurate observations played in ruling out geocentric models and models with perfectly circular motion. (most important: Kepler and Galileo)
- No questions on: Sections 4-5, 4-6, 4-7, or 4-8; details of geocentric models (e.g. epicycles and deferent's; names of ancient -– pre-Kepler that is --astronomers, etc.); Figure 4-6 and all the names that go with it (e.g. elongation, inferior conjunction, etc.); Box 4-1