11 February, 2014 R. W. O'Connell

**ASTRONOMY 1210**

**HELPFUL HINTS FOR FIRST MIDTERM**

The first midterm will be on **Wednesday, February 19**. You will have the full class period (75 minutes) to complete it.

**Coverage:** The exam will cover all lectures and assigned reading in the textbook through Monday, Feb. 17. Reading assignments are on the Study Guides. The exam will cover Guides 1 through 8 and Chapters 1 through 4 (except section 4.5 on tides) in the Bennett text. You are not responsible for Chapter S1.

**Emphasis:** The emphasis will be more on the lectures than the textbook.

**Style:** The exam will be mainly objective (true/false, multiple choice) with some fill-in questions and a few brief answer (3-4 sentences) questions. The "puzzlahs" have provided good examples of the style of the questions that will be on the exam. You should also look at the "Exam Prep" link on the course homepage; that includes additional sample questions (with answers).

You must answer objective parts of the exam on scantron (bubble) sheets. I will supply those. **Be sure to bring a #2 pencil with you.**

You will *not* be asked to do computational problems on the exam. However, you will be asked to show what I call a *quantitative perspective*. Here is a sample of this kind of question:

> If the mass of the Earth were doubled, the gravitational force exerted by the Earth on the Moon would: (A) stay the same; (B) double; (C) quadruple.

If you are uncomfortable with such semi-quantitative questions, don't worry about them, since the great majority of exam questions will not be of this type.

**Review:** I will hold a question-answer session covering the material on the exam on **Tuesday, February 18 at 6 PM in Gilmer 190** (not Clark 107). I will not give a formal review but will answer all questions concerning the material. Please come prepared with questions.

**Things to Study:**

All the *Study Guides* from the course home page and your *lecture notes*. You are not responsible for the material labeled *optional reading* except to the extent that it was discussed in class.

All the *reading assignments*; these are given for each lecture on the corresponding Study Guide.

The *key topics* listed on the reverse of this page.

**Things to Ignore:**

*Numerical values* of quantities such as the Earth's mass, the length of the Astronomical Unit, etc. However, you should be familiar with the *relative scales* of quantities we have discussed in class. For example: the Moon is about 1/4 the diameter of the Earth; the Sun is about 100 times the diameter of the Earth; and so forth. You should know how to put such concepts into *quantitative perspective* (as mentioned above).

The *"Mathematical Insight"* sections in the text.

*Tabulated material* such as the eclipse data in Table 2.1 or the energy comparisons in Table 4.1.

Specific historical *dates*, except to be able to place the progress of scientific thought into context. For instance, you should know that Tycho's observational work preceded Kepler's Laws; but you don't have to know the date of Kepler's birth. You don't need to know the *names* of secondary historical figures. (See over for names you should know.)

The *"Exercises and Problems"* sections in the text contain items that go beyond what we have covered in class. I do **not** recommend that you use these to review the material. Do, however, read the *"Summary of Key Concepts"* section.

# KEY TOPICS

## Introduction

SCIENCE: VALUES — EMPIRICAL TESTING — VS. IDEALISM, RELIGION
ASTRONOMY AS SCIENCE: — INFLUENCE ON SOCIETY — SCALES OF SPACE/TIME
LIGHT TRAVEL-TIME DISTANCES — "LOOKBACK" EFFECT
SCALE & STRUCTURE OF THE GALAXY AND NEARBY UNIVERSE
THE "TOP-10" FEATURES OF COSMIC HISTORY

## The Night Sky

NAKED EYE MEASUREMENTS — OBSERVABLE PHENOMENA
ANGULAR MEASURES — MAGNITUDES — CONSTELLATIONS
CELESTIAL SPHERE: — POLES, EQUATOR, ZENITH
MOTIONS MEASURED AGAINST THE STARS: SUN, MOON, & PLANETS
DIURNAL MOTION — DAY VS. NIGHT — HORIZON
ANNUAL MOTION OF SUN — ECLIPTIC PLANE — ZODIAC
NORTH/SOUTH MOTION OF SUN — EQUINOXES, SOLSTICES — ORIGIN OF SEASONS

## Ancient Astronomy

MOTIVATIONS FOR ASTRONOMY IN ANCIENT CULTURES
HELIACAL RISINGS — HORIZON INTERCEPTS — BUILDING ALIGNMENTS: TYPES, EXAMPLES
MAYA ASTRONOMY — THE LONG COUNT & 2012
LUNAR PHASES & THEIR CYCLE — POLAR PRECESSION
LUNAR & SOLAR ECLIPSES: — SHADOW GEOMETRY — CONDITIONS FOR ECLIPSE
GREEKS: MAIN ACCOMPLISHMENTS IN MATH & ASTRONOMY — ERATOSTHENE'S METHOD
PTOLEMY'S MODEL: — GEOCENTRIC — ASSUMPTIONS
RETROGRADE MOTION IN — EPICYCLES

## Discovery of Gravity

COPERNICUS' MODEL: — HELIOCENTRIC — SIMPLICITY OF
RETROGRADE MOTION IN — "COPERNICAN PRINCIPLE"
PARALLAX AS A FACTOR IN TESTING COPERNICAN MODEL
TYCHO: IMPLICATIONS OF SUPERNOVA 1572 — OBSERVATIONAL CONTRIBUTIONS
GALILEO: — EXPERIMENTAL PHYSICS — REJECTION OF ARISTOTLE
DISCOVERIES WITH TELESCOPE & THEIR IMPLICATIONS
KEPLER: MODELS MUST AGREE WITH DATA — ELLIPTICAL ORBITS
K'S LAWS OF PLANETARY MOTION — SUN EXERTS FORCE

## Gravitional Orbits & Space Flight

NEWTON: LAWS OF DYNAMICS — THEORY OF GRAVITY
GRAVITATIONAL ORBITS: — HOW DERIVED FROM NEWTON'S LAWS
TYPES: CONIC SECTIONS — ESCAPE VELOCITY
CONSISTENCY WITH KEPLER'S LAWS
FREE-FALL ORBITS INDEPENDENT OF MASS
ROCKETS & SPACE FLIGHT