18 February, 2008 R. W. O'Connell

ASTRONOMY 121

HELPFUL HINTS FOR FIRST MIDTERM

Coverage: The first midterm will cover all assigned reading in the textbook and the lectures through February 20. Reading assignments are on the Study Guides. The exam will cover Guides 1 through 9 and Chapters 1 through 5 in the text, except for Section 3.4 (on predicting eclipses), the discussion of tides (pp. 97-98), and Section 5.3 (on Einstein's relativity theory).

Emphasis: The emphasis will be about *equally distributed* between the lectures and the reading. The lectures obviously contain the topics I consider most important. There will be questions on material there that is not covered in the text. However, the reading elaborates on some topics I introduced in the lectures but didn't have time to cover fully.

Style: The exam will be mainly objective (true/false, multiple choice, fill-in) with a few brief answer (3-4 sentences) questions. You must answer objective parts of the exam on a scantron (bubble) sheet. **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 **Sunday, February 24 at 5 PM** in 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 *reading assignments*; these are given for each lecture on the corresponding Study Guide.

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

The sections at the end of each chapter titled *"Summary," "New Terms," "Review Questions," & "Discussion Questions."*

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).

Tabulated material such as the eclipse data in Tables 3-1 and 3-2.

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 Tycho's death.

The sections at the end of each chapter titled *"Problems"* (mostly more difficult or involved than is appropriate for the exam), *"Critical Inquiries for the Web"* or *"Exploring TheSky."*

KEY TOPICS

Introduction

SCIENCE: VALUES	EMPIRICAL TESTING	VS. IDEALISM, RELIGION
ASTRONOMY AS SCIENCE:	INFLUENCE ON SOCIETY	SCALES OF SPACE/TIME
NIGHT SKY:	NAKED EYE MEASUREMENTS	OBSERVABLE PHENOMENA
	ANGULAR MEASURE	CONSTELLATIONS
CELESTIAL SPHERE:	POLES	EQUATOR
MOTIONS AGAINST 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 ANCIENT ASTRONOMY

HELIACAL RISINGS	HORIZON INTERCEPTS	BUILDING ALIGNMENTS: TYPES, EXAMPLES

MAYAN ASTRONOMY

LUNAR PHASES & THEIR CYCLE	POLAR PRECESSION	
LUNAR & SOLAR ECLIPSES:	SHADOW GEOMETRY	CONDITIONS FOR ECLIPSE

GREEKS: MAIN ACCOMPLISHMENTS IN MATH & ASTRONOMY

PTOLEMY'S MODEL:	GEOCENTRIC	ASSUMPTIONS
	RETROGRADE MOTION IN	EPICYCLES

Discovery of Gravity

COPERNICUS' MODEL:	HELIOCENTRIC	SIMPLICITY OF
	RETROGRADE MOTION IN	IMPLICATIONS OF

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
	LAWS OF PLANETARY MOTION	SUN EXERTS FORCE
NEWTON: LAWS OF DYNAMICS	THEORY OF GRAVITY	LEGACY OF
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

Science and Technology

DIFFERENCE & SYMBIOSIS	EXAMPLES OF CONVERSION & RATES	
KEY TECHNOLOGIES	ELECTROMAGNETISM	SOCIETAL IMPACT