

ASTRONOMY 108: Descriptive Astronomy

Spring 2008

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Office Hours: M 2:00-3:00 PM, Th 10:00 -11:00 AM; W 5:30-7:30 PM; or
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Class Time and Location: M, W, F 1:00 to 1:50 AM in IRC-1

Final Exam: Monday May 12, 2008 11:00 to 1:30 AM

Required Text: **The Cosmic Perspective**, Fifth Edition , by Jeffrey Bennett, Megan Donahue, Nicholas Schneider and Mark Voit,

The text comes with SkyGazer software which will help you an opportunity to visualize some of the phenomena that we will discuss and produce your own sky maps. The text also includes the MasteringAstronomy student access kit. MasteringAstronomy is an online homework system that we will be this semester. The online homework is designed to reinforce concepts from class and readings and access to this system will be required for the course. While text books are expensive, they are also a critical component to getting the most out of a class such as this. If, you choose to purchase an earlier less expensive edition of the current text, you should keep in mind that you (not the instructor) are responsible for dealing with differences between the editions of the text. You may also have to get a MasteringAstronomy student access kit separately (~\$25 online).

Science Discovery Center: <http://www.oneonta.edu/organizations/sdc/>

The Science and Discovery Center of Oneonta is located in the basement of the Physical Science Building on the SUNY Oneonta Campus. This highly regarded interactive science *museum* provides you a unique opportunity to observe, feel and experience many of the principles and concepts that we will be discussing in this course. While we will use this facility for demonstrations and assignments, I highly recommend that you also visit the Science and Discovery Center on your own time.

Course Description:

ASTR 108, Descriptive Astronomy, 3 s.h.: Survey study of our solar system, stars, the Galaxy, other galaxies and the universe; methods and problems of astronomy. Does not include laboratory. Not open to students enrolled in or who have completed ASTR 110. (LA, N2, N, T)

SUNY General Education Science Learning Outcomes Defined (N2/NL2): Students will demonstrate an understanding of the methods scientists use to explore natural phenomena, including observation, hypothesis development, measurement and data collection, experimentation, evaluation of evidence, and employment of mathematical analysis, and application of scientific data, concepts, and models in one of the natural sciences.

Course Objectives:

1a) Students should understand the relationship between observation, theory and experimental validation that comprise the scientific method by which we achieve our current understanding of astronomical phenomena. Further, students should try to appreciate the overall importance of this process and the dedication, imagination, ingenuity, luck, frustration and pleasure that are part of the process.

1b) Students should gain an understanding of the physical principles that are used to understand and interpret astronomical phenomena.

1c) Students should learn some basic observational and experimental facts about astronomical objects and the *current* models that are used to explain and interpret these facts.

2) Students should develop skills and confidence in critical and logical analysis so that they become effective and independent problem solvers. (Here students should become familiar with the examination and interpretation of observations; calculation and estimation of physical quantities for comparison with observation, theory, and other quantities; scaling for insight into the relative sizes of astronomical objects; various geometric techniques for visualizing the location and motion of astronomical objects.)

3a) Students should gain familiarity with reliable sources of astronomical information (including traditional, technological, and internet) and develop skills for assessing the reliability of additional sources of astronomical information.

3b) Students should develop the confidence to use reliable sources of astronomical information to independently examine and enjoy the night sky with the naked eye (small telescope or binoculars).

Evaluation:

Your score for the course will be determined according to the following distribution.

Attendance	10 %
Homework/Activities	30 %
Exam I	20 %
Exam II	20 %
Final Exam	20 %

In the strictest possible case, your course grade will be related to your score in the following manner:

100 >A> 93 >A-> 90 >B+> 87 >B> 83 >B-> 80 >C+> 77 >C> 73 >C-> 70 >D+> 67 >D> 63 >D-> 60 >E

However, if the instructor determines that grading on an overall curve is warranted, your final grade may be higher than indicated by the above relationship.

Participation: It is reasonable for students to expect to spend two to six hours per week outside of class on the material (reading, homework and possible group activities). Your work outside of class will be evident in your homework and exam grades. While work outside of class is extremely important, diligent work in class will help you master the material more efficiently and enhances your work outside of class. Consequently, students are expected to be in attendance, on time and attentive. Students are expected to participate in class by **asking** and answering questions and providing their own insights related to physical principles and phenomena that are being discussed. Attendance will be taken on ten randomly chosen days through the semester. The fraction of these days that you attend will be multiplied by 100 to determine your numerical attendance grade.

Homework: In addition to reading and in-class assignments, periodically (about weekly) homework will be given through the Mastering Astronomy online homework system. Each homework assigned will be graded automatically. To determine your overall homework grade, I will drop the lowest grade of any individual homework and average the remaining individual homework grades. If I determine that a curve is warranted on the overall homework grade, your overall homework grade may be slightly higher. The goal of the Mastering Astronomy on-line homework assignments is to reinforce and practice concepts from class and readings. You should expect to do well (80 or above) on your overall homework grade if sincerely try to attain the answer to each question on your own and complete each assignment. While you may generally discuss questions with classmates, you must provide specific answers to homework questions on your own. Even if you get questions wrong, the hints that you will find in Mastering Astronomy should help you master the material.

Exams: Three (approximately 45 minute) examinations including the final examination will be given. These examinations are not cumulative except as the course material naturally builds on itself. Exams will be in a multiple choice format with answers to be marked in #2 pencil on a separate answer sheet for machine scanning. Exams will be based on lectures, reading assignments, recitation exercises, and homework assignments.

Mathematics: It is impossible to teach a physical science class without encountering some math along the way. Although advanced mathematics will not be used in the course, some exercises will be geared towards developing quantitative, graphing and analytical skills. These skills can be extremely valuable in your personal endeavors and are also desirable to employers in a large number of areas. However, the mathematics encountered on an examination will be no more than basic addition, subtraction, division and multiplication (which may be combined in a straight forward formula). Calculators are not required but may be helpful during some exercises and on exams.

Missed Work: A makeup of an exam may be allowed for an authorized absence or with the advanced permission of the instructor. While late homework will be accepted, it may be penalized 10% per day late.

Tentative Schedule for Spring 2007 Semester

Below is a *tentative* schedule of the topics that will be covered and the corresponding reading. You will note that the topics are divided into three sections that could roughly be called Historical Astronomy, the Solar System, and Stellar Astronomy. While we may not be able to cover all of the topics listed in each section, the time allotted for each section and the corresponding exam dates are firm.

DATE	TOPIC	READING
	Section I: The Sky, Celestial Motions, Historical Astronomy	
1/16-1/18	Spatial scale, temporal scale and motion in the universe.	Chapter 1
1/21-1/25	Observing the Night Sky: Locating Objects, Motion of Objects, Seasons, Moon Phases and Eclipses, Planets.	Chapter 2
1/28-2/1	Greek and Renaissance Astronomy	Chapter 3
2/4-2/8	Physical Principles in the Motion of Astronomical Objects	Chapter 4
2/11-2/15	EXAM I WED 2/13/2008 What Does Light Tell Us About Matter in the Universe?	Chapter 5
2/18-2/22	BREAK	
	Section II: Origin and Properties of the Solar System	
2/25-2/29	What Does Light Tell Us About Matter in the Universe? Telescope Basics	Chapter 5 Chapter 6
3/3-3/7	Solar System: Basic Properties Solar System: Formation	Chapter 7 Chapter 8
3/10-3/14	Solar System: Formation Solar System: Geology and Atmospheres	Chapter 8 Chapters 9 and 10
3/17-3/21	Solar System: Jovian Planets Solar System: Small Bodies Solar System: Extra Solar Planets	Chapters 11, 12 and 13
3/24-3/28	BREAK	
3/31-4/4	EXAM II Friday April 4, 2008 The Sun Aurora and the Sun Earth Connection	Chapter 14
	Section III: Stars, Galaxies, and the Universe	
4/7-4/11	Stellar Properties and the HR Diagram Stellar Evolution	Chapters 15 and 16
4/14-4/18	Stellar Evolution	Chapters 16, 17 and 18

4/21-4/25	The Milky Way Galaxy, Galaxies, Hubble and the Birth of Cosmology	Chapters 19, 20 and 21
4/28-5/2	Dark Matter and Dark Energy in Evolution of the Universe The Cosmic Microwave Background	Chapters 22 and 23
5/5-5/12	Monday May 5, 2008 Review Wednesday May 7, 2008 Study Day Monday May 12, 2008 EXAM III	