AST 204: Topics in Modern Astronomy (QR)
Spring 2007

Lectures: MWF 2:30-3:20, Room 145 (auditorium), Peyton Hall

Homepage: `http://www.astro.princeton.edu/~jstone/AST204`

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Text: **An Introduction to Modern Astrophysics, 2nd ed.** (2006), by Carroll & Ostlie
also recommended: **The Physical Universe: An Introduction to Astronomy** (1982), by Shu

1 Introduction

This course presents a broad introduction to the science of astronomy, including an overview of planets, stars, galaxies, and cosmology. The intent of the course is to give the student a solid background in the primary physical concepts relevant to astronomy, and a broad exposure to the astronomical universe. By using well-known physical laws to interpret astronomical observations, students will learn how astronomers have answered some of the most fundamental questions about our Universe, such as: how old is the Sun? how do stars shine?, how far away are the most distant objects in the Universe? when did the Universe begin?, and when will it end? A working knowledge of algebra, geometry, and calculus is *essential* for this class. Therefore, **this course is for science majors, or those with a strong interest in science**.

2 Prerequisites

Students should have a solid background in freshman physics and math, including calculus. Recommended Princeton courses are PHYS 103 and 105, and MATH 104. However, the course will be relatively self-contained, that is most of the necessary physics will be quickly reviewed in the lectures before it is applied to the astrophysical problem. Thus, students with AP physics and strong math skills who are willing to work a little harder should be able to handle the material. If you are in doubt about your physics and/or math background, please see the professor.

3 Course Structure

The three weekly lectures will contain the bulk of the course material and provide a forum for general questions. It is intended that the lectures parallel the text. Thus, for a better understanding of the lecture material, it is important you read the appropriate sections in the text (preferably *before* the lecture). However, some material in the lectures may not be in the text. You are responsible for all material presented in class, even if it is not in the text.

There are no precepts in this course, although we will organize special review sessions before the mid-term and final exams.

There will be a field trip to the Rose Planetarium in New York City, where we will get a guided tour and a special lecture. Admission will be free, however you will have to find your own way to NYC (normally a large group travels together on the train). Details will be given in the lectures.

There will also be a night observing session using the telescopes on the top of Peyton Hall, weather permitting. Each student is expected to attend one session. Attendance is mandatory; there will be a worksheet which will count as one of the homework assignments that you will work through at the session. The sessions will not start until after Spring Break, more details will be given in the lectures.

4 Grading

Your final grade will be based on homework assignments (given out roughly every two weeks), the mid-term exam, and the final exam. These factors will be combined in the following percentages to determine your class grade:

20% weight on the mid-term exam;

40% on homework;

40% on the final exam.

The mid-term exam is scheduled for **March 16**. It will cover all material presented up to

that point, and will be given during the regular class lecture hour.

Homework will be assigned roughly every week and is to be turned in at the **beginning** of class on the designated day. Homework turned in after the beginning of class on the due date will be considered late. Late homework may be turned in up to 1 week after the due date, at a penalty of 20% reduction in score. After one week, we will return graded homework and hand out solution sets; no homework is accepted after that. It is expected that each homework assignment will take 2-3 hours to complete if you are attending lecture and are up-to-date on your reading of the text.

The final exam will be cumulative, drawing on all material covered in the entire course. It will be given at the time, and in the room, listed in the University exam schedule.

No.	Date		Lecturer	Title	Chpt
1	Feb.	5	JS	Intro, Scale of Things	
2		7	JS	Geocentric to Heliocentric	1
3		9	AS	Kepler's Laws, derived by Newton	2
4		12	JS	Cycles and Seasons	1
5		14	AS	Atoms and Starlight	3,5
6		16	AS	Telescopes and Detectors	6
7		19	JS	Solar System: an overview	18
8		21	JS	Earth and Moon	19
9		23	JS	The Other Terrestrials	19
10		26	JS	The Gas Giants	20
11		28	JS	Pluto and Other Snowballs	21
12	Mar.	2		**Trip to Rose Planetarium in NYC**	
13		5	AS	Extrasolar planets	
14		7	AS	The Sun	11
15		9	AS	Solar Interior	10,11
16		12	JS	Stellar Structure	10
17		14	JS	Properties of Stars	7
18		16		**Mid-term Exam**	
		19-23		**Spring Break!**	
19		26	AS	(more) Properties of Stars	7,8
20		28	AS	Hertzsprung-Russell diagram	8
21		30	JS	A Star is Born	12
22	Apr.	2	AS	Sol, This is Your Life	13
23		4	AS	Life and Times of Massive Stars	13
24		6	AS	White Dwarfs	15
25		9	AS	Neutron Stars	15
26		11	JS	GR and Black Holes	16
27		13	JS	The Milky Way galaxy	22
28		16	JS	More about the MW	22
29		18	JS	Galaxies, galaxies everywhere	23
30		20	AS	Cluster of Galaxies	24,25
31		23	AS	Active galaxies	26
32		25	AS	Cosmology	27
33		27	AS	Dark Matter and Dark Energy	27,28
34		30	JS	A Brief History of Everything	27,28
35	May	2	AS	The Future of Astrophysics	
36		4	JS	Life in the Universe	

Final Exam: TBA