ASTRONOMY 116

INTRODUCTORY ASTRONOMY
WITH LABORATORY
Fall 1992

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Astronomy is the science of the Universe, its origin, its structure, its contents, its processes, its evolution, and its ultimate fate. Astronomy is the oldest of the natural sciences and continues as a human enterprise because humanity continues to believe that the Universe is comprehensible.

This course provides an introduction to the science of astronomy, its history and its place in the history of human thought, its techniques, and its discoveries. The course will emphasize the *principles* of discovery and understanding.

Textbook and Readings. The textbook on which the course is based is William J. Kaufmann's Discovering the Universe, second edition, published by W. H. Freeman and Co., 1990. This book is available in the College bookstore. A daily schedule of lecture topics and associated readings from the text is attached. Students are expected to read the assigned sections of the text both in preparation for class and after the lecture. Additional readings from other sources may be assigned, as well.

Class Attendance. The student is responsible for the course material discussed in class. Therefore, the students is expected to attend all classes. An inordinate number of absences will be handled in accordance with College policies.

Laboratory. Laboratory activities are designed to provide deeper understanding of subject matter through direct contact with nature and use of the methods of science. Organized and supervised observing will constitute an integral part of the laboratory. The student is required to purchase the *Edmund Mag 5 Star Atlas* as a reference for laboratory observing and for observing outside laboratory periods (see "Other" below).

Astronomy 116 laboratory periods have been scheduled for Wednesday evenings. Meeting times will vary according to the planned activity and the time of local sunset. The following is a list of laboratory periods and their expected starting times:

DATE	STARTING TIME	
26 August	8:00 p.m. EDT	
2 September	8:00 p.m. EDT	
9 September	8:00 p.m. EDT	
16 September	8:00 p.m. EDT	
23 September	8:00 p.m. EDT	
30 September	8:00 p.m. EDT	
7 October	8:00 p.m. EDT	
14 October	6:30 p.m. EDT	**Test 2** (+ possible make-up)
21 October	5:30 a.m. EDT	
28 October	7:00 p.m. EST	
4 November	6:30 p.m. EST	**Test 3** (+ possible make-up)
11 November	7:00 p.m. EST	
18 November	7:00 p.m. EST	
2 December	7:00 p.m. EST	

Since observing conditions are highly unpredictable and may affect the choice of laboratory activity, your professor reserves the right to change the starting time of a laboratory period to suit that activity. In general, however, with the exception of the lab on October 21 (begins at 5:30 a.m.), laboratory periods will not begin before 6:00 p.m. nor end after 11:00 p.m. Most sessions will last around two hours. All laboratory sessions will begin in Pierce Hall, Room 102.

Students will submit reports of laboratory work as appropriate to the work and in accordance with standards to be specified in general and in connection with each lab.

Attendance at laboratory sessions is mandatory. Excused absences will be will be handled on an individual basis and will be granted only for reasons such as illness, serious emergency and religious observance (if prearranged).

In the case of an excused absence, a make-up laboratory will be required. In the case of an unexcused absence, a grade of zero for the laboratory will be assigned.

"Classroom" conduct is the general standard of behavior for laboratory sessions.

Tests. The tests in Astronomy 116 will include objective as well as essay questions. Some questions will be quantitative in nature. A significant number of test questions will, in general, stress reasoning with principles. Laboratory material may be included.

There will be four tests, scheduled as follows:

Monday, 21 September (in class) - Introductory Principles
Wednesday, 14 October (in lab) - The Solar System
Wednesday, 4 November (in class) - Stars
Wednesday, 2 December (in class) - Galaxies and Cosmology

Laboratory rules of attendance apply to tests. In the case of an excused absence, unless it is inappropriate to the excuse, a make-up test will be given prior to the scheduled time of the test.

Other. In addition to tests and laboratory reports, the student will be asked to submit other work for credit. Such additional work will include the following:

Papers - One or more short papers will be required. Their natures will be specified when assigned. An interview may be required as part of a writing assignment.

Observing Journal - The student will be required to maintain a record of all observing in a separate notebook and in a format to be specified. These journals will be checked at midterm and at the end of the course. The student will be expected to observe at least three times outside laboratory periods.

Honor Code. The Honor Code of Oxford College applies to all work submitted for credit in this course, and all such work will be pledged to be that and only that of the individual student submitting the work.

Grading. The course grade will be assigned on the basis of 1000 points, computed as follows:

Tests (4 @ 100 points)	400 points
Laboratory	200 points
Final Exam	200 points
Other (papers, journal, etc.)	200 points
	1000 points

In general, letter grades will be determined as follows:

A	930 or more points
A-	900 to 929 points
B+	870 to 899 points
B	830 to 869 points
B-	800 to 829 points
C+	770 to 799 points
C	730 to 769 points
C-	700 to 729 points
D+	670 to 699 points
D	600 to 669 points
F	fewer than 600 points

Office Hours. Regular (generally in office - no appointments):
Mondays - 2:30 to 4:30 p.m.
Wednesdays - 2:00 to 3:00 p.m.
Tuesdays & Thursdays - 2:00 to 3:30 p.m.

Other Possible Hours (by appointment):
Mondays & Wednesdays: 10:00 to 11:00 a.m.
Tuesdays: 8:30 to 9:15 a.m. & 3:30 to 4:30 p.m.
Thurdsays: 8:30 to 9:15 a.m. & 12:30 to 2:00 p.m.
Fridays: 10:00 to 11:00 a.m. & 2:30 to 4:00 p.m.

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Lecture Schedule & Textbook Reading Assignments

Mon., 24 August	Overview of the course and its subject matter; astronomical scales	Ch. 1
Wed., 26 August	Apparent motions; the Celestial Sphere model	Ch. 2
Fri., 28 August	Seasons, lunar phases, and eclipses	Ch. 2
Mon., 31 August	Ptolemaic (geocentric) and Copernican (helio-centric cosmologies; Kepler's Laws	Ch. 3 (pp. 32-39)
Wed., 2 September	Galileo's contributions; Newton's Laws	Ch. 3 (pp. 39-43)
Fri., 4 September	Einstein and relativity; the electromagnetic spectrum; elementary optics	Ch. 3 (pp. 44-47) Ch. 4 (pp. 50-57)
Mon., 7 September	*Labor Day (no class)*	
Wed., 9 September	Telescopes	Ch. 4 (pp. 54-67)
Fri., 11 September	Blackbody radiation; Stefan-Bolzmann Law; Wien's Law; Planck's Law	Ch. 5 (pp. 71-77)
Mon., 14 September	Spectra; spectroscopes; Kirchhoff's Laws	Ch. 5 (pp. 77-82)

Wed., 16 September	Atomic theory and spectral lines; the Doppler Effect	Ch. 5 (pp. 82-89)
Fri., 18 September	Review	
Mon., 21 September	**Test 1** (in class)	
Wed., 23 September	The Solar System in general	Ch. 6
Fri., 25 September	The major terrestrial planets (Venus, Earth, Mars); the Jovian planets (Jupiter, Saturn, Uranus, Neptune)	Ch. 7
Mon., 28 September		
Wed., 30 September		Ch. 8
Fri., 2 October	Mercury and the Moon	Ch. 9 (pp. 167-178)
Mon. 5 October	Other small terrestrial worlds (the Galilean satellites of Jupiter, Titan, Triton, Pluto-Charon)	Ch. 9 (pp. 178-191)
Wed., 7 October	Asteroids, meteoroids, and comets; the Sun	Ch.10 Ch. 11
Fri., 9 October	The Sun (continued)	Ch. 11
Wed., 14 October	Review (**Test 2** will be given during the Wednesday lab period)	
Fri., 16 October	The nature of stars	Ch. 12
Mon., 19 October		
Wed., 21 October		
Fri., 23 October		

Mon., 26 October	Stellar evolution: death	Ch. 13
Wed., 28 October	states of stars	Ch. 14
Fri., 30 October		
Mon., 2 November	Black holes	Ch. 15
Wed., 4 November	Review (Test 3 will be given during the Wednesday lab period)	
Fri., 6 November	Milky Way Galaxy	Ch. 16
Mon., 9 November		
Wed., 11 November	Galaxies; quasars	Ch. 17
Fri., 13 November	and active galaxies	Ch. 18
Mon., 16 November		
Wed., 18 November	Cosmology	Ch. 19
Fri., 20 November		
Mon., 23 November		
Mon., 30 November	Review	
Wed., 2 December	Test 4 (in class)	
Fri., 4 December	The search for extra-terrestrial life	Afterword

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TUESDAY, 8 DECEMBER: **Final Examination**
9:00 a.m.