Fall 9-1-2001

ASTR 363.01: Stellar Astronomy and Astrophysics I

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ASTRONOMY 363
STELLAR ASTRONOMY AND ASTROPHYSICS I
Fall 2001

Meets MWF 10:10 - 11:00 in SC 230/231
INSTRUCTOR: Dave Friend (for now)
Office: SC 127, ext. 5283 (Physics and Astronomy office ext. 2073)
Office Hours: MWF 1:10 - 2:00 and by appointment
(more hours to be added later)

TEXT: An Introduction to Modern Astrophysics by Brad Carroll and Dale Ostlie

COURSE CONTENT AND GRADING:

This course (Astronomy 363-364) is intended to provide a fairly complete introduction to the field of stellar astrophysics, or the physics of stars. We will be using several different branches of physics to describe stars: classical mechanics, thermodynamics, special relativity, quantum theory, atomic physics, and nuclear physics. I will assume that you are very familiar with classical physics, but I will spend some time reviewing the topics in modern physics. The 2 semesters will concentrate on the following topics:

363: stellar properties, spectra, atmospheres, and interiors
364: stellar models, the sun, and stellar evolution

During the first semester we will cover the observed properties of stars (especially their spectra) and the physics of their atmospheres and interiors. We will spend some time with chapters 1, 2, 3, and 5, and then cover chapters 7 to 10 in great detail (see the outline on the second page for details).

CLASS MEETINGS: I will spend most of each class period lecturing, but class participation will also be an important part of the course. We will sometimes go over homework problems during class. I will frequently ask you questions, and I expect you to ask me questions too, especially when I have asked that you carefully read a specific section in the text. We will also do some computer simulations as class demonstrations from time to time.

EXAMS: There will be three in-class mid-term exams and a final exam. The final, which will be on Wednesday, December 19th, will be semi-comprehensive, emphasizing the material in the last part of the course. You may bring one sheet of paper with you for the exams with anything written on it that you want.

RESEARCH PAPERS: Near the end of the semester, each student will be required to submit a 4 - 5 page paper. The paper should be on one class of stellar or interstellar object, with an emphasis on an interesting recent discovery. I will ask you for a paper topic roughly a month or so before the end of the semester.

HOMEWORK ASSIGNMENTS: There will be several homework assignments, which will constitute a substantial portion of your grade. We will probably go

over some of the problems during class. You should plan to hand in the assignments during class, but if everybody is having trouble with certain problems, I'll let you hand them in later in the day. There will be a late penalty (except when you have a valid excuse) of a 10% point reduction per day late.

GRADING: final grades will be calculated as follows:

first exam	15%
second exam	15%
third exam	15%
final exam	25%
homework assignments	20%
paper	10%

COURSE OUTLINE

week of		main topics	reading in text
Sep.	5	introduction to the properties of stars	1.3, 3.1
	10	the continuous spectra of stars	3.2, 3.4-3.6
	17	the nature of spectral lines	5.1, 5.3
	24	Kepler's laws and orbits	2.1, 2.3
	26	FIRST EXAM	
Oct.	1	binary stars and determining stellar masses	7.1 - 7.3
	8	spectral classification; excitation and ionization	8.1 15
		summary of stellar properties: the H-R diagram	8.2
	19	SECOND EXAM	
	22	radiation and radiative transfer	9.1, 9.2
	29	stellar atmospheres and opacity sources	9.2, 9.3
Nov.	5	the structure of spectral lines	9.4
	12	spectral line broadening (Monday holiday)	9.4
	19	THIRD EXAM (Thanksgiving break W, F)	
	26	introduction to stellar interior structure	10.1, 10.2
Dec.	3	energy generation; the virial theorem	10.3, 2.4
	10	energy transport	10.4
	19	FINAL EXAM	

Last day to add: September 24
Last day to drop (without petition): October 15