ASTRONOMY 410
Stellar Astronomy
Course No. 11532R

Fall Semester 2002
Place & Time: GFS 104
T Th 9:30-11:00 a.m.

Instructor: Dr. Geraldine J. Peters
Office: SHS 271
Office Hours: T Th 11:00 - 12:30 p.m. (or by appointment)
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Textbook

An Introduction to Modern Stellar Astrophysics by Dale A. Ostile & Bradley W. Carroll

Examinations and Grades

Your grade in this course will be based upon two midterm examinations, the comprehensive final examination, and homework assignments as follows: Midterm Exams (15% each), Final Exam (35%), and Homework (35%). You are required to take all of the examinations and NO MAKEUP EXAMS will be permitted. If you miss a midterm due to, for example, illness or a University-sponsored academic event, your score on the other midterm will be doubled. Please notify me if you will not be present to take a midterm.

The dates for the Midterm Examinations are:

Tuesday, October 1, 2002.
Tuesday, November 5, 2002.

For completion of this course, you are required to take the Final Examination, which will be held on Tuesday, December 17, 2002 from 8:00-10:00 a.m. The date and time for the final examination are set by the University and cannot be changed.

The questions on the exams will cover the lecture material, assigned reading, and homework. They will be a combination of short answer questions, problems similar to those assigned for homework, and more extensive essay-type questions that examine comprehension of the material and concepts. The final exam will cover material from the entire course, with a slight emphasis on topics covered after the second midterm. The exams are closed-book.

Details on Homework will be described as it is assigned. New problems may be assigned at each lecture, although the cumulative problem set will be due every 3-4 lectures.

General Topics for Course

1. The basic properties of stars and how they are determined, including stellar positions, motions, distances, luminosities, colors, effective temperatures, radii, masses, spectra, rotation, pulsation, and magnetic fields.

Astronomical instrumentation.

2. The basics of the theory of stellar atmospheres, including radiative and convective transfer of energy, stratification in the atmosphere, continuous and line radiation, spectral analysis, determination of chemical abundances, and stellar chromospheres, transition regions, coronae, winds, and mass loss.

3. The interstellar medium (ISM), basics of stellar evolution including stellar pulsation and stellar remnants, mass transfer in close binary systems, clusters of stars.

Course Outline

Date	Assigned Reading[†]	Sample Lecture Topics	Homework Due
Aug. 27 (T)		Celestial sphere, stellar coordinates	
Aug.. 29 (Th)	Ch. 1.1, 1.3	Precession, proper motion, Essentials of spherical trigonometry	
Sep. 3 (T)	Ch.1.4	Star names, star catalogues	
Sep. 5 (Th)	Ch. 3.1-3.2	Stellar distances, magnitudes	
Sep. 10 (T)	Ch. 3.3-3.4	Continuous radiation	HW#1
Sep. 12 (Th)	Ch. 3.5-3.6	Blackbody radiation, colors	
Sep. 17 (T)	Ch. 5.1-5.2	Spectral line radiation	
Sep. 19 (Th)	Ch. 5.3-5.4	The Bohr atomic model, basics of quantum mechanics .	
Sep. 24 (T)	Ch. 6.–6.3	Astronomical observation, optics & optical telescopes, radio telescopes	HW#2
Sep. 26 (Th)	Ch. 6.4	Telescopes on spacecraft, Midterm Review	
Oct. 1 (T)		MIDTERM #1	
Oct. 3 (Th)	Ch. 2.3, Ch.7.1	Kepler's Laws	
Oct. 8 (T)	Ch. 7.2, 7.3	Stellar masses & radii	
Oct. 10 (Th)	Ch. 8.1	Spectral line formation	
Oct. 15 (T)	Ch. 8.2	The H-R Diagram	HW#3

Oct. 17 (Th)	Ch. 9.1	The radiation field, specific Intensity, flux, radiation pressure	
Oct. 22 (T)	Ch. 9.2-9.3	Stellar opacity, radiative transfer I	
Oct. 24 (Th)	Ch. 9.4	Radiative transfer II, strengths & profiles of spectral lines	
Oct. 29(T)	Ch. 10.1-10.2	Stellar interiors I: hydrostatic equilibrium, pressure eq. of state	HW#4
Oct. 31 (Th)	Ch. 10.3	Stellar interiors II: energy sources Midterm review	
Nov. 5 (T)		MIDTERM #2	
Date	Assigned Reading†	Sample Lecture Topics	Homework Due
Nov. 7 (Th)	Ch. 10.4-10.5	Stellar interiors III: energy transport model interiors	
Nov.12 (T)	Ch. 12.1	The interstellar medium (ISM)	
Nov. 14 (Th)	Ch. 12.2-12.3	Protostars, Pre-Main Sequence evolution	HW#5
Nov. 19 (T)	Ch. 13.13.2	Post Main-Sequence evolution: early & late stages.	
Nov. 21 (Th)	Ch. 13.3-13.4	Evolution of massive stars, star clusters	
Nov. 26 (Th)	Ch. 14.1-14.2, 14.4, 15.1-15.2	Selected topics in stellar pulsation & stellar remnants	HW#6
Nov. 28 (Th)		THANKSGIVING HOLIDAY	
Dec. 3 (T)	Ch.15.3-15.6. 17.1-17.5	Close binary star evolution, accretion disks, neutron stars & black holes (Selected topics)	
Dec. 5 (Th)		Final Review	HW#7
Dec. 17(T)		FINAL EXAMINATION (8:00-10:00 a.m.)	

† Occasionally, supplementary handouts will be provided.

Information concerning this course, including solutions of the homework assignments and midterm examinations will be posted on the Physics/Astronomy website: http://physics.usc.edu/Classes/A410/