

AST 731

Stellar Interiors

Reference Book: *Stellar Interiors* by C.J. Hansen, S.D. Kawaler and V. Trimble

Office hours:

Week	Date	Subject	Reading
1	Aug. 29	Overview	Ch. 1
	Aug. 31	Preliminaries	Ch. 1
2	Sept. 5	Labor Day	
	Sept. 7	An Overview of Stellar Evolution I	Ch. 2
3	Sept. 12	An Overview of Stellar Evolution II	Ch. 2
	Sept. 14	An Overview of Stellar Evolution III	Ch. 2
4	Sept. 19	An Overview of Stellar Evolution IV	Ch. 2
	Sept. 21	Equation of State I	Ch. 3
5	Sept. 26	Equation of State II	Ch. 3
	Sept. 28	Radiative and Conductive Heat Transfer I	Ch. 4
6	Oct. 3	Radiative and Conductive Heat Transfer II	Ch. 4
	Oct. 5	Heat Transfer by Convection I	Ch. 5
7	Oct. 10	Heat Transfer by Convection II	Ch. 5
	Oct. 12	Stellar Energy Sources I	Ch. 6
8	Oct. 17	Stellar Energy Sources II	Ch. 6
	Oct. 19	REVIEW	
9	Oct. 24	Mid-term exam	
	Oct. 26	Stellar Modeling I	Ch. 7
10	Oct. 31	Stellar Modeling II	Ch. 7
	Nov. 2	Stellar Modeling III	Ch. 7
11	Nov. 7	Astroseismology I	Ch. 8
	Nov. 9	Astroseismology II	Ch. 8
12	Nov. 14	Astroseismology III	Ch. 8
	Nov. 16	Structure and Evolution of the Sun I	Ch. 9
13	Nov. 21	Structure and Evolution of the Sun II	Ch. 9
	Nov. 23	Structure and Evolution of White Dwarfs I	Ch. 10

14	Nov. 28	Structure and Evolution of White Dwarfs II	Ch. 10
	Nov. 30	Structure and Evolution of White Dwarfs III	Ch. 10
15	Dec. 5	Review and Discussion	
	Dec. 7	Summary	
	Dec. 12	Student Presentation	

Course description:

This is an astrophysics course for astronomy major graduate students. It is a survey course designed to introduce the students to the basic concepts and principles of stellar structure and the microphysics of the equation of state, opacity, and nuclear reactions. Stellar evolution will be examined using semi-quantitative approaches. This course is worth 3 credits.

The learning outcomes:

The outcomes will include familiarity with the key physical processes operating in stars (e.g., energy production and transport inside a star), key concepts and methods of hydrodynamics needed to understand stellar structure and evolution. Other outcomes will be working experience in solving stellar structure problems using analytic and numerical techniques, and being able to communicate via presentation of the work of others.

Grading:

The course grade will be based on homeworks, a numerical problem assignment, a mid-term exam, and a presentation.

- There will be five homeworks during the semester. Each homework will be worth 5 pts. (the total of 25 pts can be earned from homeworks). You may use any available materials to solve the problems. You are also encouraged to discuss the problems with each other, while you are trying to solve homework problems, with the provision that after the discussions you must write up your solutions yourself, independently from anyone else. This rule will be taken very seriously under the UNLV honor system. In particular, it should be stated in the submitted solutions who you have discussed the problems with (as a form of acknowledgements).
- Each student will be given a problem to be solved using numerical methods. It is to master a concept/idea and use a computer to generate a numerical solution of a specific problem. There will 20 pts. to be earned from this.
- Each student will be assigned to read one or more research papers related to this course. Some additional thinking and possible ideas of research projects are encouraged. Each student will give an hour presentation at the end of the semester. 30 pts will be assigned for reading / presentation.

- The mid-term exam is on October 24. There will be 5 problems each worth 5 pts. (i.e., the total of 25 pts can be earned). No printed materials are allowed during the exam.
- Final Letter grades will be assigned according to the numerical scores (100 total).
A (>=85), A- (80-84),
B+ (77-79), B (73-76), B- (70-72)
C+ (67-69), C (63-66), C- (60-62)
D (50-59)
F (<50)

Other information:

Academic Misconduct — Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at:
<https://www.unlv.edu/studentconduct/student-conduct>.

Copyright — The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC) — The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

Religious Holidays Policy — Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit:
<http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Transparency in Learning and Teaching — The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further information:
<https://www.unlv.edu/provost/teachingandlearning>
<https://www.unlv.edu/provost/transparency>

Incomplete Grades — The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student's control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving "I" grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

Tutoring and Coaching — The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895-3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.

UNLV Writing Center — One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at:
<http://writingcenter.unlv.edu/>.

Rebelmail — By policy, faculty and staff should e-mail students' Rebelmail accounts only. Rebelmail is UNLV's official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students' e-mail prefixes are listed on class rosters. The suffix is always **@unlv.nevada.edu**. **Emailing within WebCampus is acceptable.**

Library Resources — Students may consult with a librarian on research needs. For this class, the subject librarian is

https://www.library.unlv.edu/contact/librarians_by_subject. UNLV Libraries provides resources to support students' access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu/>.

Final Examinations — The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.