Astronomy 606: Stellar Structure and Evolution

Instructor:

Professor: Cole Miller
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Class web page: http://www.astro.umd.edu/∼miller/teaching/astr606

Schedule:

Lectures on Tuesday and Thursday from 12:30 to 1:45, CSS 0201.

Textbooks:

Required: *Stellar Interiors* by Hansen and Kawaler.
Recommended: *Stellar Structure and Evolution* by Kippenhahn and Wiegert, and *Principles of Stellar Evolution and Nucleosynthesis* by Clayton

Course Grading

Homework	25%
Midterm Exam	25%
Final Exam	35%
Individual Project	10%
Class Participation	5%

Feel free to discuss homework with other students, but you must work out and write up the solutions yourself. I will grade each problem (in the homework and in the exams) on a four-point scale. One point is awarded if you demonstrate understanding of the physical issues associated with the problem. One point is awarded if you use the correct equations. Two points are awarded for correct solution of the equations. If you come up with an answer that is obviously incorrect (e.g., a velocity 1000 times the speed of light!), but correctly say why it is incorrect and approximately what the right answer is, you will get one of those possible two points. For some of the problems (which will be marked clearly), to get full credit you will need to not only get the right answer, but show that your answer has the correct limits, symmetry, etc. as dictated by the problem. The midterm and final will both be in-class, and we can negotiate whether they are open-book or closed-book.

Homework will be assigned approximately every two weeks (or less, for short assignments), on Thursdays. The homework will be due at the beginning of class one or two Thursdays later, and I will return the graded homework to you by the following Thursday. The reason I want you to turn in your homework at the beginning of class is so that you can absorb the content of that lecture instead of worrying about the problems! I will therefore enforce this policy strictly, and will take off points for, e.g., homework turned in at the end of class.

The individual project will be a report on one current topic in high energy astrophysics. I'll want you to have selected the topic you'll discuss by the week after the midterm, so that we can talk about it and make sure it's a good project. The report will be both a written report (4-5 pages in double-spaced 12pt format) and an oral report, which will be given in class at the end of the semester. For this project you will be graded on both content and presentation in the oral and written reports. Class participation will be determined by attendance and by participation during classes; I will ask many questions during class, and while I don't expect you to get the "right" answer every time I do want you to try.

Letter Grades

I will guarantee that you will receive no worse than the following letter grades for a given percentage of the total available points:

85%–100%	A
70%–85%	B
55%–70%	C
40%–55%	D

I may grade on a curve if the class average is significantly lower than suggested by the table.

Late Policy and Make-Up Policy

Partial credit for late homework assignments may be given if you give me a valid reason by the Tuesday before the assignment is due. No credit will be given for homework turned in more than a week after the due date (i.e., after the beginning of class the following Thursday). If you cannot make the midterm or the final exam, then we can arrange a different time if you tell me at least a week before the exam (to be fair to other students, the alternate time should be before the scheduled time).

Tentative Course Outline

Jan 29 – Feb 7: Overview, equilibrium conditions, simple models.
February 12–14: Energy generation and nuclear processes.
Feb 19 – Feb 26: Equations of state.
Feb 28 – March 7: Opacities
March 12: Midterm.
March 14: High densities and strong magnetic fields.
March 19–21: Convection, observation of star formation.
March 25–31: Spring break
April 2–11: Stellar formation and evolution.
April 16–18: Neutron stars and black holes.
April 23: Binaries.
April 25–30: Detailed modeling; Ol' Sol, white dwarfs.
May 2: Neutrinos and asteroseismology.
May 7–9: Presentation of projects.
May 14: Recap, emphasis of points brought up during semester.
May 20: Final exam, 10:30 AM to 12:30 PM.