Tuesdays and Thursdays, 12:00 – 1:45 PM
Natural Sciences Annex 101
Course web page: http://www.ucolick.org/∼woosley/

Professor's Contact Information

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Topics

This course provides an introduction, at the upper division level, to the theory of stellar structure and evolution. We begin with a brief review of observations of stars and what they tell us. Then we spend several weeks discussing the physics and physical processes that govern the behavior of stars, followed by an application of these principles to a theory for the structure and evolution of main sequence and post-main sequence sequence stars. We complete the course with a discussion of the final stages of stellar evolution and explosive phenomena involving stars.

Texts

The textbook for the class is *An Introduction to the Theory of Stellar Structure and Evolution* by Dina Prialnik, though much of the course will be based upon two other sources: a) the printed class notes from the last time this class was offered by Gary Glatzmaier (which is in turn largely derived from previous notes by Mark Krumholz) and b) the on line textbook by O. R. Pols at the Astronomical Institute in Potsdam. Both of these sources will be available for a limited time for downloading on line at the class website. In addition, hard copies of the Glatzmaier-Krumholz notes are available for a modest fee at the bookstore. I suggest that you buy a hard copy. It's easier than downloading and trying to print yourself. Another very useful text, though aimed more at graduate students, is *Principles of Stellar Evolution and Nucleosynthesis* by D.D. Clayton. Much of the same material is covered in greater depth and the discussion of nuclear astrophysics is particularly good. Another useful references not used explicitly in the class *Stellar Structure and Evolution* by R. Kippenhahn and A. Weigert. Copies of both Clayton's book and Kippenhahn and Weigert will be on reserve at the Science Library (a new version of Kippenhahn and Weigert just came out but it's $100)

Assignments and Grading

There will be four or five problem sets and two major examinations, i.e., a midterm and a final. You are allowed to discuss problems, but each student should submit original work. Given the class size and detail of the problems, the possibility of graders for the problem sets is being explored. Depending on outcome, there could be additional short, single problem exams in class following each homework, prior to the posting of solutions. Exams will be in class and consist of both closed book and open book portions. A student's final grade will be based on the four homework sets (and possibly their associated quizzes) (45%), the midterm exam (25%), and the final exam (30%).

Website

The class website is http://www.ucolick.org/ woosley/. There you will find, at least for

awhile, downloadable copies of the two electronic textbooks - Glatzmaier and Krumholz (2013) and Pols (2011). The homework assignments and their solutions will also be posted there along with copies of all slides shown in class (after the class has been presented). Other information and useful links will also be provided. You should visit the site frequently. It will be updated throughout the quarter.

Dates	**Topic**	**Reading**	**Homework**
Apr 1	Observing stars	GK 1; Pr 1.1,1.2; Po1	
Apr 3	HR Diagram and Stellar Masses	GK 2; Pr 1.4; Po 1	
Apr 8	Spectroscopy and abundances	GK 1; Pr 2	
Apr 10	Hydrostatics, Virial theorem	GK 3,4; Pr 1.3, 2; Po 2,8	
Apr 15	Equation of state	GK 5; Pr 2, 3; Po 3	HW 1
Apr 17	Radiation transport	(GK 6; Pr3.7; Po 5	
Apr 22	Polytropes	GK 9, 10; Pr 5; Po 4	
Apr 28	Convection and other instabilities	GK 11, 12; Pr 6; Po 5	
Apr 29	Nuclear physics	Cla 4; GK 7; Pr 4.1; Po 6	HW 2
May 1	Nuclear reactions	Cla 4; GK 7,8; Pr 4; Po 6	
May 6	**Midterm Exam**		
May 8	Star formation and early evolution	GK 15; Pr 9,12; Po 9	
May 13	Overview of core evolution	GK 13; Pr 7; 12; Po 8	
May 15	Main sequence stars	GK 14; Pr 7, 9; Po 7, 10	
May 17	Post main sequence: low M	GK 16; Pr 4,7, 9; Po 11	HW 3
May 22	Post-helium burning: high M	Po 12; GK 8; Pr 4, 7	
May 24	Core-collapse supernovae	GK 17; Pr 10; Po 13	
May 27	Novae and Type Ia supernovae	Po 13; Pr 10; 11	
Jun 3	Neutron stars and black holes	GK 18; Pr 10, 11	HW 4
Jun 5	Pair SN and Other exotica		
Finals Week	**Final Exam**		