

Astronomy 220A  
Stellar Structure and Evolution  
Fall 2010 Quarter, MWF 9:20-10:40 am, ISB 356

**Instructor:**

Jonathan Fortney, Assistant Professor  
Room 275 ISB, 831-502-7285, [jfortney@ucolick.org](mailto:jfortney@ucolick.org)  
Office hours: Whenever you like on MWF mornings after class

**Class Web Site:**

[www.ucolick.org/~jfortney/220A.htm](http://www.ucolick.org/~jfortney/220A.htm)

**Required Text:**

Stellar Structure and Evolution, by R. Kippenhahn and A. Weigert, 1990.

**Additional texts that may be helpful:**

Stellar Interiors: Physical Principles, Structure, and Evolution, by C. J. Hansen, S. D. Kawaler, and V. Trimble, 2004.

Principles of Stellar Evolution and Nucleosynthesis, by D. D. Clayton, 1983

Asteroseismology, by C. Aerts, J. Christensen-Dalsgaard, and D. W. Kurtz, 2010

**Structure of the course:**

There will be 27 lectures, predominantly over material in the required text, in this order:

- Review of Observational Data
- Fundamental Physics and Equations
- Energy Transport in Stellar Interiors
- Properties of Stellar Matter
- Energy Generation
- Building Models: Equations, Boundary Conditions, Numerical Methods
- Polytropes
- Early Stellar Evolution
- Chemical Evolution on the Main Sequence
- Late Stellar Evolution and Nucleosynthesis
- Brown Dwarfs and Giant Planets
- Compact Objects
- Pulsations, Helioseismology, and Asteroseismology

**I will be out of town:**

No lecture on: Wednesday Oct 6, Friday Oct 8, Wednesday Oct 20, Friday Oct 22.

Consequently each lecture will start at 9:20, rather than 9:30, to make up this time

**Grading:**

There will be four problem assignments, roughly every other week (*40% of grade*)

You will need to construct a stellar structure model and write up the results by the end of the quarter (*40%*). Details will be given in a separate handout.

A brief review (3 pages) of a recent article (within the past 5 years) from the literature, along with a 10-minute in-class presentation on the paper (*20%*)

Exams: We'll try it without a final this quarter