

ASTR3007/4007/6007: Part I: Stars

Semester 1, 2017

Lectures: Thursday 10 - 11 AM, Friday 10 AM - 12 PM, Hancock 2.24

Tutorials: Thursday 11 AM - 12 PM, Gould 113

Course web page: http://www.mso.anu.edu.au/~krumholz/teaching/astr3007_s1_2017/

Instructor Contact Information

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Topics

This part of the course provides an introduction to stellar structure and evolution. We will begin with a brief review of observations of stars and what they tell us. Then we discuss the physical processes that govern the behaviour of stars, followed by an application of these principles to develop a theory for the structure of main sequence stars. We will end this part of the course with a discussion of stellar evolution and the stellar life cycle.

Texts

Our main textbook for the class will be *An Introduction to the Theory of Stellar Structure and Evolution*, by Dina Prialnik. This book is available in two editions, and either one is fine for the class. For a more extensive treatment of stars and stellar structure at roughly the same level of sophistication, you can consult *An Introduction to Modern Stellar Astrophysics*, by Dale Ostlie and Bradley Carroll. A graduate-level treatment is given in *Stellar Structure and Evolution* by Kippenhahn and Weigert.

Assignments

There will be 3 problem sets for this part of the course; the due dates are listed below. You are *strongly* encouraged to work together on the problem sets, but each student must write up and turn in his or her own work.

Schedule

Date	Topic	Reading	Assignments
Feb. 23	Observing the stars		
Feb. 24	Stellar masses; virial theorem	Chapter 1	
Mar. 2	Principles of stellar evolution		
Mar. 3	Equation of state	Chapters 2, 3	
Mar. 9	Energy, entropy, and transport		Problem set 1
Mar. 10	Nuclear Reactions	Chapter 4	
Mar. 16	Simple stellar models		
Mar. 17	Stability and convection	Chapters 5, 6	
Mar. 23	The main sequence		Problem set 2
Mar. 24	Low mass stellar evolution	Chapter 7	
Mar. 30	Massive stellar evolution		
Mar. 31	Supernovae and stellar remnants	Chapters 9, 10 (8, 9)*	
Apr. 6	–		Problem set 3

*The first pair of chapter numbers refers to the 2nd edition of Prialnik; the second pair are for the 1st edition.