MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Physics
Astrophysics I (8.901) — Spring 2013

Welcome to 8.901

This is the first half of a two-semester graduate-level sequence on astrophysics. Topics include: the Kepler problem, binary stars, exoplanets; stellar structure and evolution; white dwarfs, neutron stars, and black holes; close binaries and accretion; the interstellar medium; radiative processes and astrophysical plasmas; the structure of the Milky Way.

Our goal is to provide a foundation in astrophysics that will help you satisfy your curiosity, understand the scholarly literature, and embark on original research. Many astrophysics students also find 8.901 (and 8.902) helpful in preparing for Part III of the Physics General Examination.

Prerequisites

We will assume a physics background equivalent to an MIT senior undergraduate physics major, including mechanics, electricity & magnetism, statistical mechanics, quantum mechanics, and relativity. No prior study of astrophysics is required.

People

Lecturer	Prof. Josh Winn	37-664b, `jwinn@mit.edu`
Graduate Teaching Assistant	Mr. Josh Dillon	37-628g, `jsdillon@mit.edu`
Course Manager	Ms. Nancy Boyce	4-315, `nboyce@mit.edu`

Schedule

- Lectures: Mondays, Wednesdays, and Fridays from 10-11, in 3-442.
- Office hours: TBD.
- Weekly problem sets, due in class.
- Midterm exam on Friday, March 22; final exam to be scheduled.

Required textbook

Astrophysics for Physicists by A. R. Choudhuri (Cambridge University Press, 2010)

Other useful books

Astrophysics in a Nutshell by D. Maoz (Princeton University Press, 2007). A concise physics-oriented overview, similar to Choudhuri, but at a slightly more elementary level.

An Introduction to Modern Astrophysics by B. W. Carroll and D. A. Ostlie, 2nd ed. (Addison-Wesley, 2007). The opposite of concise, with much more astronomical lore.

Theory of Stellar Structure and Evolution by D. Prialnik, 2nd ed. (Cambridge University Press, 2010). We will follow her treatment of stellar evolution.

Radiative Processes in Astrophysics by G. B. Rybicki & A. P. Lightman (Wiley-VCH, 2004). The standard graduate-level work on the subject.

Black Holes, White Dwarfs, and Neutron Stars by S. L. Shapiro and S. A. Teukolsky (Wiley, 1983). Also a standard graduate text.

Grades

Your grade will be based on the problem sets (40%), midterm exam (25%), and final exam (35%). Small grade adjustments will be made to reward class participation.

Other Policies

- The course web site provides a calendar with lecture topics, reading assignments, and office hours. Announcements, problem sets and solution sets, and other materials will also be distributed using the web site:

  `http://stellar.mit.edu/S/course/8/sp13/8.901`

- Each lecture has a corresponding reading assignment. Please read the assigned material before the lecture, or immediately afterward.

- We encourage you to work together on problem sets. You should wrestle with a problem yourself, then discuss it with your friends, and then write up the solution by yourself. You may *not* consult solution sets from previous years.

- Late problem sets will not be accepted.