

## Astronomy 682: Introduction to Cosmology

Meetings: MWF 1:30-2:48, 2186 Smith Lab

Instructor: David Weinberg, 4041 McPherson Lab, 292-6543

Office hours: Tuesday and Thursday, 9:30 - 10:30 am, or by appointment.

Course web page: <http://www.astronomy.ohio-state.edu/~dhw/A682/a682.html>

Midterm Exam: Wednesday, April 25, 1:30pm - 2:48 pm, in class

Final Exam: Wednesday, June 6, 1:30 pm - 3:18 pm

### Course Objectives

This course is an advanced undergraduate level introduction to astrophysical cosmology, with emphasis on the “standard” big bang theory of the universe and, in the latter part of the course, its extension to a more detailed theory (the inflation + cold dark matter + cosmological constant model) that is presently the leading scenario for explaining the origin of structure in the universe. The course is intended to give you a solid understanding of the fundamentals of this exciting subject, with a degree of rigor that will prepare you for graduate study in the field if you choose to pursue it.

### Course Outline

Since I have not previously taught this course (though I have taught its graduate-level counterpart), I cannot easily predict how long it will take to cover different topics. However, the topics I hope to address during the course are:

Observational and theoretical basis of the standard model

Spacetime and the Friedmann-Robertson-Walker metric

Dynamics of the expanding universe

Evolution of homogeneous cosmological models

The cosmic microwave background

Big Bang nucleosynthesis

Dark matter and dark energy

Inflationary cosmology

Cosmic microwave background anisotropy

Formation of galaxies and large scale structure

### Readings

We are fortunate to have an excellent textbook for this course, *Introduction to Cosmology*, by Barbara Ryden. Dr. Ryden is a Professor of Astronomy at Ohio State, and she developed this textbook out of her own course notes for Astronomy 682 in years past. *Introduction to Cosmology* won the American Astronomical Society’s Chambliss Writing Award for an outstanding advanced undergraduate textbook; it was the first recipient of this award. I will list reading assignments from the textbook in class.

### Assignments and Grading

The most important requirement is to attend class and take good notes. Even though we have a good textbook, it is a supplement to the lectures, not a replacement, and you will not be able to learn the material from the textbook alone.

The course grade will be based 10% on class participation, 40% on problem sets, 20% on the midterm exam, and 30% on the final exam. Please check *now* for any conflicts with the midterm exam or final exam (dates and times listed above) and let me know of any conflicts immediately.

Problem sets will be assigned approximately once a week and should typically take 6-10 hours to complete. Problem sets may be turned in in class or to my mailbox by 5 pm on the day they are due. Late problem sets will be marked down, and problem sets more than 2 days late will not be accepted.

**Students with Disabilities** Any student who feels that he or she may need an accommodation based on the impact of a disability should contact the Professor to discuss their specific needs. We will work with the Office for Disability Services to verify the need for accommodation and develop appropriate strategies. Students with disabilities who have not previously contacted ODS are encouraged to do so in advance by visiting the ODS website and requesting an appointment.

### **Academic Misconduct**

All OSU instructors are required to report suspected cases of academic misconduct to the Committee on Academic Misconduct. See the University's Code of Student Conduct for details.

In this course, you may consult with your classmates when working on problem sets. However, you must write up your solution on your own.