

## **Astronomy 5682: Introduction to Cosmology Spring 2013**

Meetings: TR 12:45-2:05, Scott Laboratory E0103

Instructor: David Weinberg, 4041 McPherson Lab, 292-6543, [weinberg.21@osu.edu](mailto:weinberg.21@osu.edu), mailbox in 4055 McPherson

Office hours: Wednesday, 11:15 - 12:30, Thursday 9:15 - 10:30. Other times available by appointment. I should always be in for office hours unless I have notified the class otherwise, but it's useful to send me an email if you are planning to come to office hours just to remind me (even ~ 20 minutes ahead is useful).

Course web page: <http://www.astronomy.ohio-state.edu/~dhw/A5682>

Midterm Exam: Thursday, Feb 21, in class

Final Exam: Tuesday, April 30, 2:00-3:45, in usual classroom

### **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**

The topics I plan 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 handed out on Thursdays and will be due at the beginning of class the following Thursday, unless otherwise noted. They should typically take 6-10 hours to complete; there will be roughly eight during the semester. I will accept problem sets up until 5 pm on Friday (they can be put in my mailbox in McPherson Lab if I am not in my office) but will mark them down 10 points for lateness. I will not accept problem sets that are more than two days late.

The problem sets are a crucial part of the course. While they partly serve the function of testing your knowledge and abilities, their most important functions are to help you learn the course material and to teach you new things.

The principal function of the exams is to test your understanding of the course material, but often in the form of applying what you have learned in somewhat new ways. I try to design exams that teach you something, so that you know more coming out than you did going in (even though it may *feel* like you know less than you thought you did!).

## **Students with Disabilities**

Any student who feels that he or she may need an accommodation based on the impact of a disability should contact me to discuss specific needs. I 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; this is often a good way to learn. However, you must write up your solutions independently. No consultation is allowed on exams.