

Cosmology, Spring 2015

Course Objectives

Course Outline

We will devote roughly half of the course to the description of the large scale, homogeneous universe (Part I below) and half to topics in structure formation (Part II below). The individual topics listed below will occupy 1-3 lectures apiece.

PART I: THE HOMOGENEOUS UNIVERSE

Observational and theoretical basis of the standard model

A minimal sketch of general relativity

Homogeneous cosmological models (the Friedmann-Robertson Walker universe)

Thumbnail sketch of cosmic history

The cosmic microwave background

Primordial nucleosynthesis

Horizons and inflation

PART II: THE INHOMOGENEOUS UNIVERSE

Perturbation theory

Spherical collapse

The cold dark matter paradigm

The cosmic expansion history and dark energy

Microwave background fluctuations

Large-scale structure

Galaxy formation

Readings

There is no required textbook, but there are several that will serve as useful references.

Ryden, *Introduction to Cosmology*

Mukhanov, *Physical Foundations of Cosmology*

Peacock, *Cosmological Physics*

The first two are introductory books, while Peacock is more advanced and technical. There are also several papers that serve as useful pedagogical guides or references for various topics.

Hogg, *Distance Measures in Cosmology*, astro-ph/9905116

Baumann, *TASI Lectures on Inflation*, arXiv:0907.5424

Weinberg, *Observational Probes of Cosmic Acceleration*, arXiv:1201.2434

Assignments and Grading

The course grade will be based 60% on problem sets and 40% on a presentation to the class on a relevant topic in cosmology. Problem sets will be every 2-3 weeks and should take 4-8 hours to complete.