290C

George F. Smoot

Fall Semester 1998

Text for 290 C; not required: Introduction to Cosmology by Matts Roos
Supplementary texts: Gerhard Borner, The Early Universe: Fact and Fiction, 2nd ed. (1992). Rowan-Robinson, The Cosmological Distance Ladder (1985); Longair, High Energy Astrophysics, 2nd ed. (1992–93); Shapiro and Teukolsky, Black Holes, White Dwarfs and Neutron Stars (1983 — paperback addition available); J. Frank, A.R. King and D.J. Raine, Accretion Power in Astrophysics, 2nd ed. (1992 — paperback edition available); Alan Lightman et al, Problem Book in Relativity and Gravitation (1975)

PHYSICS 290C. Cosmology Seminar (1-4) 1.5 hours of lecture and one hour of discussion per week. Prerequisites: Graduate or Senior standing in Astronomy or in Physics, or permission of the instructor.

Syllabus

PHSYSICS 290C: Cosmology Seminar - 22.5 lecture hours — 15 lectures — 1-4 units 1.5 hours/week lecture, 1 hour/week discussion

1. Introduction, Elements of Cosmology
2. The Role of Gravity in Cosmology
   Newtonian Derivation of Friedman Equation
   Elements of General Relativity for Cosmology
3. Cosmological Models (Friedmann & de Sitter)
4. Thermodynamics of the Early Universe
5. Relics of the Big Bang
6. Problems with the Big Bang Model
7. Cosmic Inflation
8. The Cosmological Constant

Determination of Cosmological Parameters

9. Supernova
10. Gravitational Lensing
11. Large scale structure: Growth of density fluctuations
12. The Cosmic Microwave Background - Spectrum
13. The Cosmic Microwave Background - Anisotropies Theory
14. The Cosmic Microwave Background - Anisotropies Theory II
15. The Cosmic Microwave Background - Polarization
    Sunyaev-Zeldovich Effect
16. Cosmology and Mythologies: Where are we?