

## **Cosmology Syllabus; PH 405/505 Winter, 2007**

The course will concentrate on cosmology with a smattering of general relativity as necessary. The text is *Relativity, Gravitation, and Cosmology*, by Ta-Pei Cheng. The lectures will be based on the text but will draw on many other sources, so be sure to attend class and take good notes. The following is a list of topics and places in the text where you can read about them.

Week #1: Introduction. What's in the universe and how do you know?  
Chapter 1, Sections 7.1 – 7.2

Week #2: A review of special relativity.  
Chapter 2

Week #3: The equivalence principle and the physics that can be done with it.  
Chapter 3

Week #4: The notion of curved spacetime. Metrics and geodesics. Measures of distance.  
Chapters 4 and 5, Section 7.3

Weeks #5 and 6: Friedman's equations. The cosmological constant. Model universes.  
Scaling laws. Equations of state. The benchmark universe.  
Sections 8.1 – 8.3, 9.1

Week #7: Nuclear physics and nucleosynthesis. Neutrinos and other elementary particles.  
Section 8.4

Week #8: Inflation. The flatness problem and the fine tuning problem.  
Section 9.2

Week #9: The cosmic microwave background and its fluctuations.  
Sections 8.5 and 9.3

Week #10: SNe Ia. The accelerating universe. The concordant picture.  
Sections 9.4 – 9.5.