

## **8.952: Particle Physics of the Early Universe**

**Lecturer: Alan Guth**

Mondays and Wednesdays, 11:00 am – 12:30 pm, Room 1-375

Textbook: *Cosmology*, by Steven Weinberg (Oxford University Press, 2008)

The course this term will bear essentially no relation to the description given in the course catalogue. The goal will be to discuss the material in Steve Weinberg's new cosmology book, going through it almost cover to cover. Since the term is finite, we will probably omit the chapter on gravitational lensing, and we will be able to leave out some details here and there. The bulk of the book, however, forms a coherent discussion from which it is hard to chip off pieces. I will try to restrain myself from adding material to the book, since there is already a substantial amount of material to learn in one term.

The topics will include basic cosmological models with a summary of observations, the cosmic microwave background, the thermal history of the early universe (including nucleosynthesis, baryogenesis, and cold dark matter), inflation, the evolution of cosmological perturbations, anisotropies of the microwave background (including polarization), the basics of structure growth, and the calculation of cosmological perturbations arising from inflation.

There will be approximately one problem set per week, and no exams. The course will be graded entirely on the basis of the problem sets.

It would be very helpful for students to have taken, or at least be taking concurrently, Relativistic Quantum Field I (8.323) and General Relativity (8.962). Students without this background will be admitted at their own risk.