

COSMOLOGY & RELATIVITY

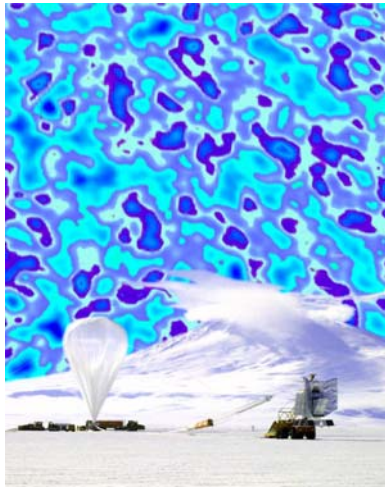
ASTRONOMY 3740-001

MWF 12:00-12:50 PM
Room G131 Duane Physics

Professor: Jason Glenn

Office: Room C329B, Duane Physics, (303) 492-6073; jglenn@casa.colorado.edu

Office Hours: M 1:00-2:00 & by appointment



Cosmic microwave background radiation anisotropies observed with the Boomerang experiment. Boomerang is in the foreground and Mt. Erebus is in the background (photo courtesy the Boomerang team, the NSF, and NASA). These observations have been used to measure the large-scale geometry of the Universe.

Course Prerequisites:

Required: Physics 1110 & 1120

Required: Math 1300 & 2300 or APPM 1350 & 1360

Recommended but not required: Astronomy 1120, 1020, or 1040

If you have not taken these prerequisites, you should take Astronomy 2010, Modern Cosmology.

Course Goals

1. Develop a basic understanding of Special Relativity and General Relativity for studying Modern Cosmology.
2. Understand the modern theory of the structure and evolution of the Universe as a whole and the role of astronomical observations in shaping that theory.

Course Content

- Special Relativity: physics at speeds approaching the speed of light
- General Relativity: a general mathematical formalism for 4-d spacetime
- Black Holes: distortion of spacetime near massive objects
- Theoretical Cosmology: mathematical formalism
- Observational Cosmology: astronomical measurements of the Universe's properties
- The Formation and Evolution of Structure in the Universe: galaxies & galaxy clusters
- The Theory of Cosmic Inflation: an early, rapid period of expansion

Class Format

The class will consist of lectures, however discussion is encouraged and class participation may be factored into grades.

Texts

Required:

1. "Introduction to Cosmology" by Barbara Ryden.

Supplementary (not required!) texts on reserve at the Lester Math/Physics Library:

1. "Spacetime Physics" by Taylor and Wheeler, 2nd edition. This book thoroughly describes Special Relativity at a fundamental level.
2. "Principles of Cosmology and Gravitation" by Berry. This book has a good fundamental description of General Relativity related to cosmology, but is out of date.
3. "The Big Bang" by Silk, 3rd edition. This book has a good, non-mathematical description of modern cosmology.
4. "The Cosmic Perspective" by Bennett, Donahue, Schneider, & Voit, 2nd edition. This is an introductory astronomy text and would make a good reference if you have not taken an introductory astronomy class.

Coursework and Grading

Grades will be calculated as described below. They may be curved.

1. 20%-Exam I, 20%-Exam II, 25%-Final Exam. The exams will consist of problems and occasional short answer questions.
2. 35%: Homework will be assigned throughout the semester. Homework will be due at the beginning of class on the due date. I encourage you to work with other members of the class; however, copying will not be tolerated.

Late Assignments & Make-up Tests

No late assignments will be accepted without proof of extenuating circumstances. If you are in doubt about turning in an assignment on time, turn it in early or talk to me before the due date. Make-up exams will only be given with a doctor's note or the equivalent. If you cannot make the prescheduled time for the final exam, make arrangements with me for an alternative time by the end of the sixth week of class.

Attendance & Additional Policies

You will be expected to attend lectures, however attendance is not mandatory. The homework and exam questions will be drawn from lectures and assigned reading.

No assignments without names on them will be accepted. Cheating will result in a minimum penalty of zero credit.

Students with Disabilities

If you have specific physical, psychiatric or learning disabilities and require accommodations, please let me know early in the semester so that your learning needs may be met. You will need to provide documentation of your disability to the Disability Services Department (303-492-8671).

PRELIMINARY SCHEDULE

<u>Date</u>	<u>Lecture Topic or Exam</u>
Jan. 13 - Feb. 12	Special Relativity, General Relativity, and Black Holes
	No class on January 20
Feb. 14	Exam I
Feb. 17 - Mar 19	Cosmology
Mar. 21	Exam II
Mar. 24 - Mar. 28	Spring Break
Mar. 31 - Apr. 25	Cosmology
Apr. 28 - May 2	Special Topics, Review
May 5	Final Exam; 7:30PM-10:00PM, Duane G131