**C161: Relativistic Astrophysics and Cosmology**

UC Berkeley, Spring 2017

This class explores the cosmology of our universe. We cover the cosmological distance scale, elementary cosmological models, the energy density and age of the universe, evidence for dark matter and dark energy, big bang nucleosynthesis, and the growth of structure. Elements of general relativity and particle physics are introduced as they are used, and we will occasionally veer off into astrophysical applications of these concepts, e.g. in stellar-mass, supermassive black holes, pulsars, and other exterma of physics.

**Instructor**: Prof. Aaron Parsons (aparsons at berkeley). **Office**: Campbell 455. **Office Hours:** Tu 1:00p – 2:00p Campbell 233.

**GSI**: Fatima Abdurrahman (fatima.abdurrahman at berkeley). **Office Hours**: Th 11:00a – 12:00p Campbell 233. **Section/TALC**: Tu 3:30-4:30p

**GSI**: Morgan Presley (mpresley at berkeley). **Office Hours**: Fri 11:00a – 12:00p Campbell 233

**Section/TALC**: W 10:00-11:00a

**Lectures**: Tu/Th 2:10p – 3:30p, Campbell 131a

**Web**: <https://casper.berkeley.edu/astrobaki/index.php/Relativistic_Astrophysics_and_Cosmology>

**BCourses**: <https://bcourses.berkeley.edu/courses/14158119>

**Survey:**

<https://docs.google.com/forms/d/e/1FAIpQLSdcwSTGEGz4rgfwEKp8vCoMHm-EHnFSv7wz5bXmWT0LGf6V1w/viewform>

**Main Text**: Barbara Ryden “Introduction to Cosmology” (2nd Edition, Cambridge Press)

**Other Readings**:

* Schneider "Extragalactic Astronomy and Cosmology" (astrophysical properties of galaxies, clusters and other important observational facts)
* Longair "Galaxy Formation" (graduate-level cosmology)
* Weinberg "The First Three Minutes" (popular account of the thermal history of the universe)
* Thorne "Black Holes and Time Warps" (popular book on black holes and relativity)

**Grading**:

* 40% problem sets, due Fridays at 4pm
* 10% midterm, in class 3/23
* 25% presentations, in class 4/18, 4/20, 4/25, 4/27
* 25% final exam

**Guidelines for Presentations:**

In-class presentations give you the opportunity to investigate a current research topic in cosmology, using the knowledge you have gained in class. Unlike standard physics courses, cosmology is a rapidly progressing subject filled with new results. These presentations help keep us up to date. You will get a taste of the excitement in cosmological research, and practice an important science skill: giving oral presentations. Each talk (by 2-4 students, depending on class size) is 15 minutes. The audience is your classmates, so pedagogy is important. Talk as if you were a professor recruiting your classmates to work on your topic.

**Classroom Conduct:**

Cultivating a welcoming classroom environment in which all students feel supported in their learning is very important to me. Recognizing that you each bring insights and experiences to the classroom that are different from my own, I invite your feedback in whatever form you feel most comfortable (e-mail, in person conversation, anonymous note). In particular, if I ever use an example/analogy or make a comment that feels isolating or derogatory to you, I would very much appreciate the opportunity to learn from you and improve my practice. Similarly, if you feel isolated or denigrated by a comment made by one of your classmates, or you see or hear something you believe I should know about, please don't hesitate to contact me.