Cosmology
Astronomy 3785 Fall 2017
Syllabus

Time: MW 1:00pm - 2:15pm
Place: Thaw Hall 210
Instructor: Brian Batell
Office : Allen Hall 401
Email : batell@pitt.edu

Office Hours: 1:30pm-2:30pm on Friday and by appointment.

Course Website We will use the PITT CourseWeb site for this course:

https://courseweb.pitt.edu

Log in with your University ID and password and navigate to the ASTRON 3785 page. Here you will find announcements, lecture notes, homework assignments and solutions, grades, the syllabus, and other important materials. Please check this site regularly for course announcements.

Reference materials: There is no required textbook for the course. The material covered in class will draw from a variety of sources. My lecture notes will be posted on Courseweb. Some recommended textbooks are

- *Modern Cosmology* by Dodelson. This text begins with an overview of the smooth homogeneous expanding universe. It also provides an in-depth treatment of the inhomogeneous universe centering on the description of perturbations about the Friedmann-Robertson-Walker background and their evolution. Topics such as the cosmological power spectrum, CMB anisotropies, weak gravitational lensing, present-day power spectrum, and other modern topics are treated in detail.

- *The Early Universe* by Kolb and Turner. This is a classic reference that provides an excellent treatment of the the smooth homogeneous expanding universe, the thermal history, nucleosynthesis, relic particle production, phase transitions, and many other topics. However, it is an older book and therefore not up to date on the latest observational data. It also does not cover the inhomogeneous universe in detail.

- *An Introduction to Modern Cosmology* by Liddle. This text provides a good overview of modern cosmology at the advanced undergraduate level.

- *Cosmology* by Weinberg. This is an advanced, self-contained, and comprehensive treatise on modern cosmology.

Course Description: A self-contained graduate-level course covering major topics in cosmology. The course will include current cosmological observations, the paradigm of the expanding universe, Robertson-Walker spacetime, the expansion history of the universe, inflation, relic particle densities, primordial nucleosynthesis, the cosmic microwave background, structure formation, gravitational lensing, dynamics of galaxy clusters and galaxies, evidence for dark matter and dark energy.

Prerequisites: Special relativity, classical mechanics, quantum mechanics, and thermodynamics at the introductory graduate level or advanced undergraduate level. Basic elements of general relativity and elementary particle physics will be introduced as needed throughout the course.

Class Participation: Students are expected to attend and participate in class. Each class will involve a mix of lecture, discussion, and one or more student activities. Participation credit will be awarded for these activities.

Homework: Homework will be assigned every 1-2 weeks and will be due the following week. Homework will be graded and solutions to the homework will be made available after all students have turned in the assignment. Late assignments will be accepted if turned in no later than one week after the original due date and will be awarded 50% of the total credit. If there are outstanding circumstances that prevent you from completing the assignment on time, please see me to discuss the matter. I strongly encourage you to discuss the homework problems with your classmates. However, each student must write their own solutions to the homework problems.

Exams: There will be one mid-term exam and one final comprehensive exam during the semester.

Grading: The final letter grade will be awarded according to the weighted credit for class participation (10%), homework (40%), mid-term exam (20%), and final exam (30%) and will be based on the following scale:

90-100%	A^+	75-80%	B^+	60-65%	C^+	45-50%	D^+
85-90%	A	70-75%	B	55-60%	C	40-45%	D
80-85%	A^-	65-70%	B^-	50-55%	C^-	35-40%	D^-

<35%	F

Academic Integrity: All students are expected to adhere to the standards of academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity (http://www.provost.pitt.edu/info/acguidelinespdf.pdf). This may include, but is not limited to the confiscation of the examination of any individual suspected of violating the University Policy.

Disability Services: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, drsrecep@pitt.edu, (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Statement On Classroom Recording: To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the students own private use.

Student Opinion of Teaching Surveys: Students in this class will be asked to complete a Student Opinion of Teaching Survey. Surveys will be sent via Pitt email and appear on your CourseWeb landing page during the last three weeks of class meeting days. Your responses are anonymous. Please take time to thoughtfully respond, your feedback is important to me. Read more about Student Opinion of Teaching Surveys here: http://www.cidde.pitt.edu/omet/student-information/.

If you have any concerns about the course, please do not hesitate to contact me.