

ASTRONOMY 0089: STARS, GALAXIES, AND THE COSMOS

Lecture: MWF: 2:00PM – 2:50PM, 102 Thaw Hall

Instructor: Dr. Sandhya Rao

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Office hours: Thursday 3:30PM - 4:30PM or by appointment

Recitations: H: 3:00 – 3:50PM 104 Thaw Hall

F: 12:00 – 12:50PM 105 Allen Hall

F: 1:00 – 1:50PM 102 Thaw Hall

Textbooks:

1. *Investigating Astronomy, A Conceptual View of the Universe* (2nd Edition) by Slater and Freedman
2. *Lecture Tutorials for Introductory Astronomy* (3rd edition) by Prather, et al. ***Please do not use a previously used book that has been filled in.***

Course Description: The Universe in which we live is an unimaginably vast and rich place that is understandable through the same physical laws that govern our existence here on Earth. By exploring topics from our nearest neighboring stars to the farthest galaxies newly formed after the Big Bang, this course will engage your mind to better understand our Universe and your everyday world. Through active and engaged participatory lectures, we will observe the cosmos and learn about the birth, life, and death of stars and their mysterious remnants: pulsars and black holes. From studying stars and our own Milky Way galaxy, we will expand our horizons to investigate the origin and ultimate fate of the Universe.

Part of this course includes an evening tour of the University of Pittsburgh's Allegheny Observatory. The purpose of this trip will be to tour the facility and make observations of the night sky with historical and modern telescopes, weather permitting. A percentage of your course grade will be based on participation in one of these field trips. There will be free buses to the observatory on Tuesday and Wednesday nights. You will sign up during recitation. Don't wait for the last couple of weeks to sign up, because there may not be room to accommodate everyone at the last minute! Sign-ups are first come first served. **If you have a class-scheduling conflict on both Tuesday and Wednesday nights, please come and see me as soon as possible.**

This is a self-contained course for students not majoring in the physical sciences. The course is mainly descriptive in nature, but some of the lectures will make use of simple arithmetic and geometry since astronomy is a quantitative science. However, memorization of formulae will not be required. This course forms an appropriate sequence with Astronomy 0087, Astronomy 0088, Physics 0081, or Physics 0089.

Lecture Tutorials: Part of the learning in this course will be based on a set of "lecture tutorials": 10-30 minute exercises, which you will work on in small groups during either class or recitation. These lecture tutorials have been extensively tested and found to greatly increase learning and retention of knowledge; your active participation is vital. These lecture tutorials are one of the required textbooks; you should bring it to each class and recitation.

Courseweb: Reading assignments and lecture slides will be posted on Courseweb. All course-related announcements will also be posted here, so make sure you check it often.

Course Objectives: The principal goal of this course is for students to gain sufficient background to easily understand astronomy-related news or popular articles on non-Solar System astronomy (such as those in Scientific American and the New York Times Science section, or any astronomy article online).

At the end of the course, you should also be able to explain, among other things:

- What the major motions of the Earth are, and how they relate (or do not relate) to the day and seasons
- Why the constellations seen in the sky vary over the course of the year
- How we can measure the properties of distant stars and galaxies using observations from the Earth and space
- Why the Sun shines, and why it will not do so forever
- How the Sun and other stars form and die
- Where black holes come from, and the effect they have on space and time
- How the Milky Way Galaxy we live in is similar to (or different from) other galaxies
- Why we believe many galaxies have black holes at their center
- What the main constituents of the Universe are, how it began, and what its ultimate fate will be.

Exams and Exam Policy: Students must bring their ID cards to exams, and note their “PeopleSoft” number on both the question and scantron answer sheets. Students will also be required to sign both sheets. Three mid-term exams of 50 points each will be given and the lowest grade will be dropped. These mid-terms will not be cumulative; they will each cover approximately one-third of the course material. The final exam is mandatory and will be cumulative. Each exam will account for 25% of the total grade, and will comprise of 50 multiple-choice type questions. Because of the policy of dropping the lowest exam grade, make-up exams will only be given under special circumstances and will require a written excuse from a doctor, etc.

Exam Dates:

- **Exam 1: Monday, September 29**
- **Exam 2: Friday, October 31**
- **Exam 3: Monday, November 24**
- **Final: Friday, December 5, 2:00PM – 2:50PM**
 - Note that this is your last scheduled regular class. I have changed it from your University-scheduled final, which is on Saturday, Dec 13 at 12 noon. The exam length will be the same as the midterms, but will include all topics. Please see me if you have any questions regarding the changed final exam time.

Grading scheme: The final grade will be determined from the curve of the distribution of final percentage grades. Approximately 60% of students will get As or Bs.

- Best 2 of 3 mid-term exams: 50%
- Final exam: 25%
- Recitation work and Lecture Tutorials: 20%
- Allegheny Observatory Trip: 5%
- Classroom participation: Extra Credit

More on Classroom Participation: Classroom participation will involve answering clicker questions during lecture. You will receive full credit for correct answers and 80% for incorrect answers. Your extra credit for the semester can add up to a maximum of 5 percentage points to your total score.

The classrooms are equipped with a clicker response system. At the beginning of the semester you will be assigned a number that corresponds to a particular pad. **Do not take the pads out of the classroom!** Many other classes use the same system and pads. If a pad is missing, the clicker system makes it easy to identify the student who used it last. The pads will not work with other SRS systems on campus.

Please observe the following rules for the SRS:

- Memorize your pad number and which cart it is in.
- Pick up your pad as you enter the classroom.
- If your pad is missing, check in bins of the same color as it may have been misplaced. If you still cannot find it, ask which pad you may use as an alternate.
- **Place the pad back in the proper bin at the end of lecture.**
- Only use your own pad. **Entering answers for another student (or having another student answer for you) is clearly wrong. Such behavior would be unethical and unfair, and, to be formal about it, will be a violation of the University's Academic Integrity policies.** If you are caught answering for someone else, **10 percentage points** will be deducted from your final semester score.

During the lecture I will pose one or more multiple choice questions that you will answer with your individual pad. You will be given some time to think about each question and discuss it with your neighbors. During this time the clicker system will pick up all the signals and tally the results. At the end of the time the answers from each student will be recorded and a summary of final results displayed. The questions are intended to motivate discussion with your peers and to provide me with feedback on how well you understand the material.

Academic Integrity

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. 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. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

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 the 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.