

ASTRONOMY 0089: STARS, GALAXIES, AND THE COSMOS

Lecture: TH: 11:00PM – 12:15PM, 343 Alumni Hall

Instructor: Dr. Sandhya Rao

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Recitations:	Thursday	2:00 – 2:50 PM	11 Thaw Hall
	Thursday	4:00 – 4:50 PM	11 Thaw Hall
	Friday	12:00 – 12:50 PM	105 Allen Hall
	Friday	1:00 – 1:50 PM	105 Allen Hall

Recommended Textbook: *Astronomy The Universe at a Glance* by Chaisson & McMillan, Pearson (2016). This book is available on Amazon. The book is also kept on reserve in the Hillman library. The ebook is available for free when you purchase the homework module.

Required Online Homework: *Mastering Astronomy:* We will be using the Mastering Astronomy system for homework. You can access it through CourseWeb. Instructions are provided in the Course Documents area. You will need to purchase Mastering Astronomy using the link available on our CourseWeb page. The ebook can also be accessed when you purchase Mastering Astronomy.

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 beginning October 2. You must go with the class on the bus. Arranging your own transportation or bringing friends along is prohibited. You will sign up during recitation. **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

mathematical skills since astronomy is at its heart a *quantitative* science. However, memorization of formulas will not be required. Don't worry if you feel your math skills are a little rusty – you'll have plenty of opportunity to practice them in recitation and homework exercises.

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.

Homework and Recitation: Part of the learning in this course will be based on a set of exercises, which you will work on in small groups during recitation. Recitation work is an important component of your grade, and your attendance is mandatory.

You will also be given weekly homework through the online Mastering Astronomy system. The homework sets will be a mix of multiple choice questions, simple calculations, and tutorial activities that are designed to give you a chance to explore the course material in more depth. In my experience teaching this class, students who attend class, and complete the homework and tutorials tend to do better overall, particularly on exams. Some of the homework questions will be on the exams as well.

Course Objectives: The principal goal of this course is for students to gain sufficient knowledge to easily understand astronomy-related news or popular articles. You will also appreciate how science is done and how we gain knowledge about the world around us through observation and inference.

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 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 centers
- Why we believe that dark matter and dark energy exist in our Universe
- 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 exams will be given; they will each cover approximately one-third of the course material. The exams will have 40 multiple-choice questions each. Make-up exams will only be given under special circumstances and will require a written excuse from a doctor or academic advisor. The use of books, notes or other written materials, computers, calculators, cell phones, and all devices that render documents, graphics, or connect to the internet are absolutely prohibited.

Exam Dates:

- **Exam 1: Thursday, September 26**
- **Exam 2: Tuesday, October 29**
- **Exam 3: Thursday, December 5**

Grading scheme: The final grade will be determined from the curve of the distribution of final percentage grades. Obtaining >90% of points guarantees an A, >80% of points guarantees a B, >70% of points guarantees a C, and >60% of points guarantees a D. If you are taking the class pass/fail, you need to achieve a score equivalent to a C or higher to receive a passing grade.

- 3 Exams: 60%
- Recitation: 20%
- Homework: 15%
- 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. There may be other opportunities for extra credit during the term. 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.

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 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.

Code of Conduct:

Communication is key to a productive learning environment, and we can maintain productive communication by exhibiting respect for one another. The success of the course for yourself and others depends on all of our commitment to behavior that demonstrates respect for differences, understanding towards others and a willingness to listen and learn. For these reasons, it is

unacceptable to harass, discriminate against, or abuse anyone because of race, ethnicity, gender, disability, religious affiliation, sexual orientation, or age. If you witness or are subject to such harassment, please report it to the instructor or to the Office of Diversity and Inclusion .

Title IX:

Legal text: “ No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.”

As a professor I am a mandatory reporter, and I am required to report violations of Title IX that I observe or am made aware of to the Title IX office . Title IX violations include, but are not limited to, sexual harassment, sexual violence and verbal or sexual abuse. Within the classroom, behavior in violation might appear as: suggestive jokes or innuendos, inappropriate touching, and unwanted sexual behavior or advances, but my capacity and obligation to report does not end at the classroom.