

ASTRONOMY 0089: STARS, GALAXIES, AND THE COSMOS
FALL 2020
SYLLABUS

INSTRUCTOR: Dr. Sandhya Rao

Office: 317 Allen Hall

Email: srao@pitt.edu (or email me using Canvas Inbox)

Office hours: Tuesday 3:00PM – 5:00PM or by appointment

Face to face meetings on Zoom. Sign up will be via Canvas calendar.

At the outset, I would wholeheartedly like to welcome you to our class! These are difficult times, and for most of us, learning and teaching under these circumstances is a whole new ball game. Rest assured that I am committed to making this an enjoyable and successful semester for you. There will likely be some teething problems as we get used to the new format. But we will work through them, and I am here to help you get through any issues that come up to the best of my ability. Many of the things you will learn in this course will blow your mind ☺. In order to understand them, you will learn some basic ideas of physics and how we have come to understand the Universe we live in. It's a journey. Be engaged and enjoy it!

LECTURE: TuTh: 11:05AM – 12:20PM

All our lectures will be live online through Zoom. The Zoom ID will be provided for lectures and will have to be accessed through our course page on Canvas. The lectures will be recorded and posted on Canvas. Students will not be recorded. Attendance during the live lecture is strongly recommended if technically possible but is not required. I do understand that due to connectivity issues or distant time zones, live attendance may not be feasible.

TA: Lina Florez

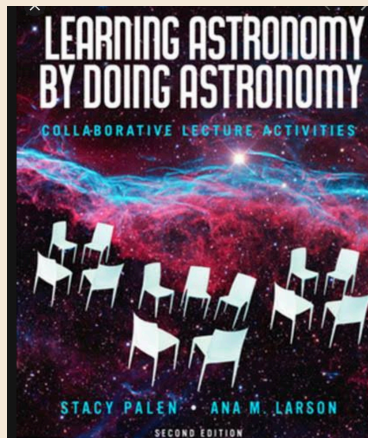
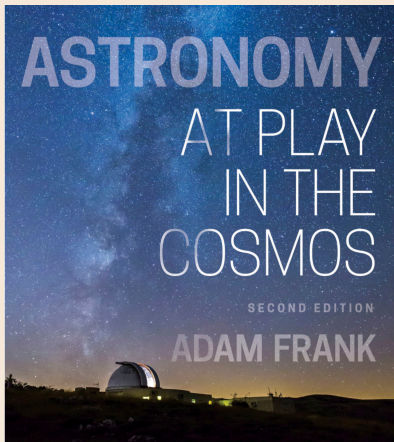
Office hours: TBD

RECITATIONS: Thursday 2:20 – 3:10 PM
Thursday 4:30 – 5:20 PM
Friday 12:10 – 1:00 PM
Friday 1:15 – 2:05 PM

Recitations will be conducted on Zoom.

CANVAS: Our course will be hosted on Canvas, the learning management system that all classes at Pitt now use (canvas.pitt.edu). Firefox and Chrome browsers work best. If you are registered for this class, you already have access to our Canvas page. I will organize all materials for the class into modules, one module per chapter. There is also a Canvas app that you can download onto your phone or tablet. All course materials will be accessible through the app. You will be able to access our Zoom lectures and recitations, homeworks, Gradescope (recitation submission site), discussion groups and every other aspect of our course from within our Canvas page.

TEXTBOOK: *Astronomy At Play in the Cosmos* by Adam Frank, Norton (2020). The eBook is available through our Canvas page. You can purchase a paper copy of the book online if you wish.



RECITATION WORKBOOK: We will be using a workbook in recitations. The activities in the workbook will allow you to work through astronomical concepts in a hands-on way and will enhance your understanding of what you learn in class. If you plan to live on campus or in the city, you need to buy the workbook from the campus bookstore. You will have to order it online on their website and pick it up in the bookstore. The book is *Learning Astronomy by Doing Astronomy* by Stacy Palen and Ann M. Larson. It will cost you \$5. If you do not plan to live in Pittsburgh during the semester, please see the document “How to obtain the workbook” under the Course Introduction module on our Canvas page.

Since our recitation sessions will be online, the easiest way to submit your work is by taking pictures of each page you worked on and submitting it using Gradescope and Canvas. Further instructions will be forthcoming when we begin using the workbook.

ONLINE HOMEWORK: *Smartwork5*: We will be using the online homework component that comes with the textbook. You can access the assignments through Canvas as and when I release them. Homework will be assigned every week and will be due every Sunday before midnight. A small penalty will be applied for late submissions to motivate you to stay on track. Exceptions will be granted in special cases.

VIDEO GAME: Yes! You will be playing a video game that will take you on specific missions through the Universe. You will use techniques learned in class to complete your missions. You will be graded for completion.

DISCUSSION BOARDS: In lieu of in-class participation, you will be engaging in discussions on class topics via Canvas discussion boards. A question will be posted each week, and you will be required to respond. The class will be divided into discussion groups. You will be graded on your level of participation and relevance of your posts. Guidelines will be posted.

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.

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.

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 is the process of science and why is it important
- 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 stars and galaxies using observations from 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: Three exams will be given; they will each cover approximately one-third of the course material. The exams will be a mix of short essay and multiple-choice questions. The use of books, notes or other written materials, calculators, and browsing the internet are prohibited. All exams will be online. The exams will not be proctored, so I am placing enormous trust in you to obey the rules of the exam. All students must practice academic integrity as laid out by the University. Integrity and honesty are qualities that will serve you well in all aspects of life, and class is no different.

EXAM DATES:

- **Exam 1: Tuesday, September 22**
- **Exam 2: Thursday, October 22**
- **Exam 3: Thursday, November 19**

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.

The many components of this course will give you many opportunities to do well in this course. Your lowest recitation and HW grades will be dropped. The grade distribution is as follows:

- Three Exams: 45%
- Recitation: 20%
- Homework: 15%
- Discussion Boards: 10%
- Video game: 10%

University COVID-19 Statement

In the midst of this pandemic, it is extremely important that you abide by public health regulations and University of Pittsburgh health standards and guidelines. If in class, at a minimum, this means you must wear a face covering and comply with physical distancing requirements; other requirements may be added by the University during the semester. These rules have been developed to protect the health and safety of all community members. Failure to comply with these requirements will result in you not being permitted to attend class in person and could result in a Student Conduct violation. For the most up-to-date information and guidance, please visit <http://coronavirus.pitt.edu/> and check your Pitt email for updates before each class.

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.