

# ASTRONOMY 89

## Stars, Galaxies, and the Cosmos

Spring 2022

### Course Information

**Meeting Time:** Monday, Wednesday and Friday, 2:00-2:50 PM  
**102 Thaw Hall**

### Instructor Information

**Instructor:** Professor Jeffrey Newman      Email: [jnewman@pitt.edu](mailto:jnewman@pitt.edu)  
Office: 310 Allen Hall (starting January 28)  
Office Hours: 3-4 PM Wednesday, or by appointment on  
zoom  
Website: <https://jnewman-pitt-edu.github.io>

**Teaching Assistant:** John Radzilowicz      Email: [jgradz@pitt.edu](mailto:jgradz@pitt.edu)  
Office Hours: TBD

I would like to welcome you to our class and am looking forward to meeting you all in person (after January 27!). Please check announcements on Canvas for all information regarding remote and in-class instruction.

We will be following University guidelines requiring masking in the classroom. This will ensure a safe classroom environment for all of us.

I am committed to making this an enjoyable and successful semester for you. Many of the things you will learn in this course will amaze you! In order to understand them, you will learn some basic ideas of physics and how we have come to know the Universe we live in. It's a journey. Be engaged and enjoy it!

**CANVAS:** Our course will be hosted on Canvas, the learning management system that all classes at Pitt use ( <https://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 week. There is also a Canvas app that you can download onto your phone or tablet. All course materials will be accessible through the app as well. You should

check Canvas often. Keep your notifications on so you don't miss postings and deadlines!

## 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 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. In any event, I will make sure that less than ten percent of your grade will be based on your answers to questions which require even basic calculations

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 from Allen Hall to the Observatory on Tuesday and Wednesday nights from March 1 to April 20 (except Spring Break week). You must go with the class on the bus. Arranging your own transportation or bringing friends along is not allowed. You will sign up during recitation. Sign-ups must be completed by the end of February and are first come first served. **If you have a class-scheduling conflict on both Tuesday and Wednesday nights, please contact me as soon as possible.**

## Textbook

*21<sup>st</sup> Century Astronomy, Stars and Galaxies, 6<sup>th</sup> edition*, by Laura Kay, Stacy Palen, and George Blumenthal, Norton (2020). The eBook is available through our Canvas page. You do not have to buy the textbook. With the University's inclusive access program, you purchased the book when you registered for this class. All required materials are included.

**RECITATION WORKBOOK:** We will be using the workbook *Learning Astronomy by Doing Astronomy*, by Stacy Palen and Ana M. Larson 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. You do not need to purchase this book separately, as the eBook version is part of the inclusive access program. You will be provided with the worksheets during recitation.

## Course Objectives

Most fundamentally, in this class you should gain sufficient background to understand popular articles on astronomy such as those in common online news sources and explain them to your friends and family. We live in exciting times, and the pace of scientific discovery will only continue to increase.

By the end of this course, you should be able to explain, among other things:

- What the process of science is and why is it important
- 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 stars form and die
- How planets around other stars are discovered and studied
- Where black holes come from, and their effects on space and time
- How the Milky Way Galaxy we live in is like or unlike other galaxies
- Why we believe many galaxies have black holes at their center
- Why we believe that dark matter and dark energy exist in our Universe
- What we know about what the Universe is made of, how it began, and its ultimate fate

By the end of the course, you should also be able to use proportional relationships to explain how one quantity varies when another is changed (no calculators should be needed for this course, though you are welcome to use non-graphing calculators if you wish).

## Course Rationale

This is a self-contained course providing an introduction to the science of astronomy for students not majoring in the physical sciences. Students who are interested in an Astronomy or Physics and Astronomy major should take ASTRON 113 instead. This class fulfills a Dietrich School Natural Science General Education Requirement and a School of Computing and Information Polymathic Contexts: Science NonSeq. General Education Requirement.

## **Recitations**

A key component of the learning in this course takes place during recitations, and your attendance is mandatory. Group exercises such as the ones you will do during recitation have been found to greatly increase learning and retention of knowledge; **your active participation in these activities, working together with other students, is vital to their success.** Exams will focus more greatly on the contents of the recitation activities than other material, as they generally explore key concepts in the class. Recitations account for 20% of your grade. Your lowest recitation score for the semester will be dropped. If you are unable to make a recitation due to a medical or other emergency, then that is the recitation that will be dropped. If you need to miss more than one recitation for an emergency, you will have to provide me and your TA with a note from your doctor or advisor. Attendance will be taken during recitations and you will not be able to get credit for recitation worksheets completed on your own outside of class.

In addition to these group worksheets, recitations will include discussion of mathematical relationships used in the class, discussion of example exam questions, and other exam preparation.

Students are encouraged to collaborate on recitation work, but collaboration on exams is strictly forbidden.

## **Homework**

We will be using the online homework system that comes with the textbook. You can access the assignments through Canvas as and when I release them. Homework will be assigned most weeks and will be due on 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. Homework is worth 15% of your grade. Your lowest homework score will be dropped.

## **Class Participation / Top Hat:**

We will use Top Hat to keep you engaged in class. You can click on the Top Hat tab on our Canvas page to get integrated. You can also use the Top Hat app and enter our class code (320515). You will answer questions via Top Hat during lecture to assess your understanding of the material that is being presented; you will need to bring a phone, pad or laptop to class for this. Your scores will be tallied at the end of semester and will count as extra credit. You can accumulate a maximum of 3% to add to your score as extra credit.

## **Exams and Exam Policy:**

Three exams will be given; they will each cover approximately one-third of the course material. Each exam is worth 20% of your grade. There is no final exam. The exams will consist of multiple-choice questions. I will provide all equations needed, etc. with the exam questions.

**Use of graphing calculators, cell phones, web pages, textbooks, search engines, tutoring services, or any other supplementary devices or materials, electronic or otherwise, is NOT permitted during exams and will be treated as academic dishonesty.** 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.

Exams will tentatively be held on:

- **Exam 1:** Friday, February 11
- **Exam 2:** Monday, March 21
- **Exam 3:** Friday, April 22

**Please inform me within the first two weeks of class if a religious holiday that would prevent you from taking the exam conflicts with one of these dates.**

## Assessment Information

### Grading

Grades will be weighted as:

60%	Exams (3 exams, each worth 20% of your final grade)
20%	Recitation
15%	Homework
5%	Observatory Trip

### Grading Scale

A grade above 90 will be guaranteed to be an A- or better, above 80 a B- or better, above 70 a C- or better, etc. It is possible that grades will be curved to be more generous than this based on final averages, depending upon how well grades correspond to achievement of learning objectives.

## Policies

### Health and Safety Statement

During this pandemic, it is extremely important that you abide by the [public health regulations](#), the University of Pittsburgh's [health standards and guidelines](#),

and [Pitt's Health Rules](#). These rules have been developed to protect the health and safety of all of us. Universal [face covering](#) is required in all classrooms and in every building on campus, without exceptions, regardless of vaccination status. This means you must wear a face covering that properly covers your nose and mouth when you are in the classroom. If you do not comply, you will be asked to leave class. It is your responsibility have the required face covering when entering a university building or classroom. For the most up-to-date information and guidance, please visit [coronavirus.pitt.edu](https://coronavirus.pitt.edu) and check your Pitt email for updates before each class.

**If you are required to isolate or quarantine, become sick, or are unable to come to class, contact me as soon as possible to discuss arrangements.**

## **Classroom Policies and Conduct**

- Be courteous to other students. As an example, carrying on a conversation during lecture or while unmuted on zoom is disruptive to the class. Students who fail to show common courtesy when requested will be asked to leave.
- 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/gender identity, disability, religious affiliation, sexual orientation, age, etc. If you witness or are subject to such harassment, please report it to the instructor or to the [Office of Diversity and Inclusion](#).

## **Your Well-being Matters**

College/Graduate school can be an exciting and challenging time for students. Taking time to maintain your well-being and seek appropriate support can help you achieve your goals and lead a fulfilling life. It can be helpful to remember that we all benefit from assistance and guidance at times, and there are many resources available to support your well-being while you are at Pitt. You are encouraged to visit [Thrive@Pitt](#) to learn more about well-being and the many campus resources available to help you thrive.

If you or anyone you know experiences overwhelming academic stress, persistent difficult feelings and/or challenging life events, you are strongly encouraged to seek support. In addition to reaching out to friends and loved ones, consider connecting with a faculty member you trust for assistance connecting to helpful resources.

The [University Counseling Center](#) is also here for you. You can call 412-648-7930 at any time to connect with a clinician. If you or someone you know is feeling suicidal, please call the University Counseling Center at any time at 412-648-7930. You can also contact Resolve Crisis Network at 888-796-8226. If the situation is life threatening, call Pitt Police at 412-624-2121 or dial 911.

## 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. **Use of graphing calculators, cell phones, web pages, textbooks, search engines, tutoring services, or any other supplementary devices or materials, electronic or otherwise, is NOT permitted during exams and will be treated as academic dishonesty.** A minimum sanction of a zero score for the quiz or exam will be imposed for violations of the Academic Integrity 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](mailto: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.

## Diversity and Inclusion

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, see: <https://www.diversity.pitt.edu/civil-rights-title-ix-compliance/policies-procedures-and-practices> .

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-

7860, or e-mailing [titleixcoordinator@pitt.edu](mailto:titleixcoordinator@pitt.edu). Reports can also be filed online: <https://www.diversity.pitt.edu/make-report/report-form>. You may also choose to report this to a faculty/staff member; keep in mind that as mandatory reporters they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

## **Email Communication**

Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address.

## **Take Care of Yourself**

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep, and taking time to relax. Despite what you might hear, using your time to take care of yourself will actually help you achieve your academic goals more than spending too much time studying. All of us benefit from support and guidance during times of struggle. There are many helpful resources available at Pitt. An important part of the college experience is learning how to ask for help. Take the time to learn about all that's available and take advantage of it. Ask for support sooner rather than later – this always helps. If you or anyone you know experiences any academic stress, difficult life events, or difficult feelings like anxiety or depression, we strongly encourage you to seek support. Consider reaching out to a friend, faculty or family member you trust for assistance connecting to the support that can help.

The University Counseling Center is here for you: call 412-648-7930 and visit their website.

If you or someone you know is feeling suicidal, call someone immediately, day or night: University Counseling Center (UCC): 412 648-7930  
University Counseling Center Mental Health Crisis Response: 412-648-7930 x1  
Resolve Crisis Network: 888-796-8226 (888-7-YOU-CAN)

If the situation is life threatening, call the Police: On-campus: Pitt Police: 412-268-2121 Off-campus: 911



## Copyright Notice

All course materials should be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials.

See [Library of Congress Copyright Office](#) and the [University Copyright Policy](#).

**Note:** The schedule and procedures in this course are subject to change. Any changes will be posted on the ASTRON 0089 Canvas site and announced in class in the case of major changes. **If you ever have any questions about anything in the class, please contact me and ask!**