

ASTRONOMY 89

Stars, Galaxies, and the Cosmos Fall 2023

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 (email is the preferred way to communicate with me)

Office: 310 Allen Hall

Office Hours: 3-3:30 PM Monday, 3-3:30 PM Friday (follow me to my office after class), or by appointment on zoom

Website: <https://jnewman-pitt-edu.github.io/>

How to pronounce my name: <https://www.name-coach.com/jeff-newman>

(preferred pronouns: he/him)

What should you call me? Dr. Newman, Professor Newman, Professor – I'm pretty flexible.

Teaching Assistant: Finian Ashmean

Email: fia14@pitt.edu

Office Hours: TBD

Accessing Course Materials

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. There is also a Canvas app that you can download onto your phone or tablet to access course materials there.

I will organize all materials for the class into modules, one module per week. You should check Canvas often. Keep your notifications on so you don't miss postings and deadlines!

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.

Textbook

The textbook for this class is *Astronomy (2nd edition)* from OpenStax. It is available for free online at www.openstax.org/details/astronomy-2e in both web view and PDF format.

You can also purchase a print version if you prefer, either from the Pitt bookstore or at https://www.amazon.com/dp/1711470570?&linkCode=sl1&tag=openstax00-20&linkId=f03cddb01a29efdeb9c8eb35e22be8f&language=en_US&ref=as_li_ss_tl. The print ISBN is 9781711470573, and the Digital ISBN is 9781951693503.

You can use whichever format you want for this class (I prefer the Web view myself).

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 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.

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.

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!

Course Objectives

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
- 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
- How planets around other stars are discovered and studied

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).

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.

Course Organization:

The class will typically be held **in-person and synchronously**.

There will be a few lectures for which I will not be available in person at the class time. In such cases, I will record a lecture asynchronously.

You will also have a weekly recitation session. Recitations will focus on working in smaller groups on lecture tutorials and activities which are intended to help you learn the most important material in the class.

Students are expected to have read the relevant sections of the textbook (listed on Canvas, along with the relevant learning goals) before attending class.

Grading

Grades will be weighted as:

| | |
|-----|---------------------------------|
| 60% | Exams (3 exams, each worth 20%) |
| 20% | Recitation activities |
| 15% | Homework assignments |
| 5% | Trip to Allegheny Observatory |

Grading Scale

An overall course 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. Grade lines may be set to be more generous than this based on final overall averages, depending upon how the class scores correspond to achievement of learning objectives.

Components of your grade:

Exams and Exam Policy:

Three exams will be given; they will each cover approximately one-third of the course material. Each exam will count as 20% of your grade. There is no final exam; the last exam will be similar in nature to the others, not cumulative. The exams will all consist of multiple-choice questions. I will provide any 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, September 29
- **Exam 2:** Monday, October 30
- **Exam 3:** Friday, December 8 (last day of classes)
- **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.**

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. At least one 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 the simple mathematical relationships used in the class, discussion of example exam questions, and other exam preparation.

Homework:

You can access homework assignments through Canvas. Homework will be assigned every week and will generally 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. Homework is worth 15% of your grade. Your lowest homework score will be dropped.

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

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 (017370). 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. At least four Top Hat grades will be dropped. Your scores will be tallied at the end of semester and will count as extra credit, raising your final average by up to 3%.

Visit to Allegheny Observatory:

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 October 3 to December 6, except for Thanksgiving 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.**

Policies

What to do if you miss a class?

Lectures: Lecture slides will always be posted, and I am happy to discuss any questions you have based upon them at office hours or by appointment.

Recitation: Attendance in recitations sessions is required and will be included in grades for this section of the course. If you will not be able to participate in recitation sections regularly, please discuss the matter with me ASAP.

We drop the lowest recitation, homework, and four Top Hat to avoid the need for excused absences.

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 a 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](#).

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, (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. 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

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.

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!**