

INTRODUCTION TO ASTRONOMY

Tuesday & Thursday | WEL 2.246 | 12:30p-1:45p

Instructor

Prof. Steven Finkelstein

(he/him/his)

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Help Sessions:

M, Th 2-3p: PMA 16.316

Teaching Assistants

Alexa Morales

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Help Sessions:

T 330-430p: PMA 16.302

F 330-430p: Zoom (see
canvas)

Abriana Himantog

abriana.himantog@utexas.edu

Help Session:

M 5-6p: PMA 16.304b

(Through the printer room)

*We would love it if you
would please wear a mask if
you visit us for help*

What is intro to astronomy about?

This introductory course for non-science majors will survey all of astronomy, starting with the ancient Greeks and how their studies led to the correct model for the Solar System, moving on to studying other stars and planets. We will finish with learning about our own Milky Way galaxy, and peering back into the early phases of the Universe to see early galaxies and understand the Big Bang. By participating in this class, *you will develop* an appreciation for astronomy and the night sky around you. *You will improve skills* in critical thinking, communication and teamwork.

This course carries the **Quantitative (QR) Reasoning flag**. QR courses are designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your adult and professional life. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real-world problems.

Course Learning Objectives: *By fully engaging in this course, you will...*

Develop a broad understanding of the nature, scope and evolution of the Universe, and where the Earth and Solar System fit in.

Improve your critical thinking and quantitative reasoning skills, and their importance in the context of the scientific process

Learn that science is a process, the world is knowable, and we come to know it through observations, experiments and theory.

Get acquainted with the history of astronomy and the evolution of scientific ideas (science as a cultural process).

Gain a familiarity with the night sky and how its appearance changes with time and position on Earth.

Each class period will have learning objectives linked to one or more of these course goals

Email Policy: I can be emailed any time for questions of a personal nature. For questions about class content or logistics, please first look to the syllabus where we've worked hard to address common questions. If you don't find the answers there, in many cases your fellow classmates may be able to help you out faster than we can (there are 100 of you and only a few of us!). In these cases please first post the question to the canvas discussion board. If no one answers after a few hours, or if you're finding many people have the same question, then please feel free to email both myself and the TA in one email, and we'll do our best to get back to you within one business day.

Required Materials:

Good news, there is only one thing you need to buy for this course! It is **Lecture-Tutorials for Introductory Astronomy, 4th Edition**, by Prather, Slater, Adams & Brissenden. Do not rent or buy used. Available at Coop or online.

Your *optional* reference text for this class is available for free online, in web view and PDF: **Astronomy from OpenStax**, ISBN 1938168283 **Link: www.openstax.org/details/astronomy** If you prefer a print version, you can purchase that from Open-Stax on amazon.com, but web view is recommended - the responsive design works seamlessly on any device. If you buy on Amazon, use the link on your book page on openstax.org so you get the official OpenStax print version.

A device for the InstaPoll *in-class response system* - we will be piloting a UT-developed **free** system through Canvas. Have ready a device which will allow you to respond to my questions.

Class recordings: These are reserved only for the use of members of this class (students, TAs, and the instructor) and only for educational purposes. Recordings should not be shared outside the class in any form.

What is expected of me in this class?

- Attend class and **participate!** Work collaboratively and be prepared to share your ideas. ***I recognize not everyone is comfortable working with others. If this describes you, please come talk to me about finding another section of 301.***
- Complete all assigned modules and quizzes on time. Make sure to take time to think deeply about the videos, and spend time with the book or come get help if you have questions before starting the quiz!
- Start the projects early! Everything you need to know is in this syllabus or on the Canvas assignment page, so you're welcome to get them done early!
- Take advantage of your teaching team, we are here to help you!

What happens in lecture?

- Not much lecturing! I have designed this class from the ground up to be very interactive, focusing on your attainment of the course learning outcomes. You will be exposed to the content outside of class through Canvas homework modules, which replace the typical lecture component.
- In class is time to work! We will review concepts you've learned prior to coming to class through Canvas homework modules, and you will work with your peers in class to practice these concepts with engaging activities.
- You will only learn if you participate, thus attendance and participation are **required!** Students distracting or not participating will be asked to leave.
- A typical class day will be composed of the following:
 - Astronomy in the news – submit at the start of class.
 - Instapoll questions to review the module
 - Several think-pair-share and discussion questions.
 - Answering questions from you about the topics which may still be unclear.
 - Activities in groups, followed by whole class discussion.

My Commitment to Diversity, Equity and Inclusion

The University of Texas at Austin serves a diverse student body, and it is my intent that all students are able to succeed in this course, regardless of their background. We are diverse in many ways, and this diversity is fundamental to building and maintaining an equitable and inclusive campus community. Astronomy belongs to all people, independent of race, religion, gender, gender identity, gender expression, or sexual orientation. Incidents of discrimination, assault, harassment, threats, intimidation, profiling, or coercion based on membership or perceived membership will not be tolerated. Show each other respect no matter perceived knowledge or performance in this class, or any other.

I pledge to you to treat all of you with respect, and I ask that you do the same in return to myself and to your classmates. In the classroom, I will gladly honor your request to address you by a name that is different from what appears on the official roster, and by the gender pronouns you use. I ask you to support one another as you talk about differences in your personal experiences whether relevant to the class or not. I intend to present course content which is respectful of diversity, including highlighting contributions to this field from scientists from underrepresented groups. To accomplish this, your suggestions (in person, email, or anonymously) are encouraged and appreciated.

How is my performance in this class assessed?

What is the grading scale?*

93.0 - 100 A
 90.0 - 92.99 A-
 87.0 - 89.99 B+
 83.0 - 86.99 B
 80.0 - 82.99 B-
 77.0 - 79.99 C+
 73.0 - 76.99 C
 70.0 - 72.99 C-
 67.0 - 69.99 D+
 63.0 - 66.99 D
 60.0 - 62.99 D-
 < 59.9 F

*no rounding

Your final course grade will be determined as follows:

20% - In-class participation: You will receive credit for this component by answering in-class think-pair-share questions through InstaPoll on your device. **Review questions from the module will only count if you answer correctly,** to ensure you engage with the module videos. **For other in-class questions you will receive points for participating.** As this component is giving you credit for participating in **all** in-class activities, it is not permissible to respond to instapoll when not in class. This grade will be calculated as an average of the grade for each class, where each class grade is equal to the percentage of questions you submit an answer to. Although **makeup participation points will not allowed,** I realize that you may need to occasionally miss class, or have a technical problem submitting a question. For this reason, Canvas will automatically **drop your five lowest participation class grades.** This large number of drops is to account for unexpected covid-related absences.

Should you miss a few classes due to COVID (or any other reason), there is no need to contact me.

Your zero grade in instapoll on those days will be dropped, and you can catch up on what you missed with the recordings on Canvas. Should illness or other circumstances cause you to miss two or more class periods in a row, please contact Student Emergency Services, and they will contact me for accommodations.

30% - Online module quizzes: Each week will have a Canvas module, with videos assigned to be completed prior to each class. The final item in each module is an end-of-week assessment quiz. These will be held outside of class time, within a designated 24 hour period, administered via Canvas. Each quiz will contain five questions, assessing your understanding of that week's material. Quizzes will unlock after

Thursday's class, and must be completed prior to the beginning of the following Tuesday's class (e.g., due at 12:30p on Tuesday). Your two lowest quiz scores will be dropped. If you miss three quizzes, then one will count as a zero. ***In general there will be no makeup quizzes***, though if you are unable to take the quiz during the designated time due to a covid-related illness, please contact me to arrange an accommodation. The quizzes are open book - you can use your course notes and course book, but ***you may not consult the internet or any other person*** (e.g., do the quiz alone).

20% - Exams: We will have two in-class exams, one on Oct 6th, and one on Dec 1st. These will cover the first and second halves of the course, respectfully. These will be 30-40 multiple choice questions, with 5-10 short-answer questions. We will hold a review session earlier in the week. There are no drops.

5% - Astronomy in the News: You will submit two astronomy news items that you have read throughout the semester by handing me a notecard prior to the beginning of class. I'll pick a few per class, bring up the website, and you will come to the front and explain your article to everyone, and moderate a short discussion. You must submit at least one news item by **October 4th**. The second one of each must be completed by **Nov 29th**. See Canvas for details on where to look, and how to turn one in.

25% - Projects: There are five projects, each worth 5% of your total grade. Details will be listed on Canvas, but a listing of the projects is provided here with a due date (any can be turned in early!):

- Project #1 (due **Sep 15 @ 12:30pm**): Diversity and Inclusion in Astronomy — You will learn about multiple women astronomers and astronomers of Color, and submit a creative report on their accomplishments. This will be turned in in-person.
- Project #2 (**due Oct 13 @ 12:30pm**): Moon Journal — Observe the Moon over the course of one phase cycle, and keep track of the phases in a journal. This will be turned in in-person.
- Project #3 (**due Oct 27 @ 12:30pm**): The Anti-Science Movement — You will investigate an anti-science movement (e.g., climate change deniers), explain the reasoning behind the believers, and show how the scientific method refutes their arguments. Due on Canvas.
- Project #4 (**due Nov 10 @ 12:30pm**): Astronomical Observing - You will attend a telescope observing night on campus, and write up a paper on the experience.
- Project #5 (**due Nov 17 @ 12:30pm**): Citizen Science - You will participate in an online citizen science activity, and turn in a reflection.

Optional Astronomy Project - You may choose to complete this optional fifth project to add points to your lowest non-zero exam grade (your lowest grade is always dropped, so this can replace your second-lowest non-zero grade). You will pick a specific astronomical object or topic and find a creative way to present about it. This could be making an electronic poster; an infographic; a video or podcast, or something else even more creative. This is a chance for you to be creative, and spend time researching and thinking about astronomy from a perspective that interests you. We want you to learn and enjoy the experience, mindful also that the optional project can add up to five points to one exam (not exceeding the maximum), so the work you put into it will be reflected in the grade you get out of it. More details can be found on the Canvas assignment. This is due no later than **Dec 1st**.

What are other policies on exams, assignments, and other course structure?

Course Website:

Canvas page for this course:

<https://utexas.instructure.com/courses/1340225>

Course Webpage: The course webpage on the Canvas system will be updated with course announcements, homework and reading assignments, and deadlines. It is your responsibility to check these on a regular basis. Please come to class prepared, having done the assigned module. Also please be prepared to participate in in-class discussions and activities, this is for your benefit.

Late work: Late work is not accepted. Makeup (or early) quizzes or exams are not offered. *However*, I understand that life events happen, so if you are unable to turn an item in on time or attend a quiz or exam, contact me ***in advance of the due date***. Note that being busy with other classes will not be considered a valid excuse. If you miss class for a sponsored University event, and you contact me ***in advance of the due date***, we can discuss accommodations.

Where can I find..?

Canvas will have:

1. Important announcements
2. Lecture slides
3. Weekly assignments and modules
4. Syllabus
5. List of Learning Objectives
6. Gradebook

Canvas will be our main form of communication, so check it regularly and stay up to date on assignments and communications.

Course Conduct: Please silence cell phones before you enter the classroom. ***No texting or using your cell phone*** during class except for use in specified classroom activities. Please do not pack up or leave class early unless you have talked to me in advance, as a consideration to us and your fellow students. Students may use laptops to take notes. Students found to be using their computers for non-class activities will be a distraction to those around them, and will be asked to leave, and will not earn participation for that day. If laptop distraction becomes a problem, I reserve the right to reverse this policy. ***Be respectful of others***, especially during in-class peer discussion times, and even if you disagree with them.

Be respectful of others, especially during in-class peer discussion times, and even if you disagree with them.

Extra credit: Other than the optional project (which can add points to one non-zero exam grade), there are no opportunities for extra credit. Please don't email me at the end of the semester asking for additional points (this includes grade rounding!).

Students with Children: I recognize the difficulty of being a full time student with children. If you have children, or other family commitments, please come see me to discuss any modifications of the course policies which will maximize your success in this course.

Email: Email is recognized as an official mode of university correspondence; therefore you are responsible for reading your email for university and course-related information and announcements. Please check your email regularly and frequently (this includes Canvas announcements).

Classroom Safety and COVID-19

This is a science classroom and we are strongly recommending that we look to the science and follow the guidance of local public health officials and the CDC. Wearing a mask indoors is the best way to prevent COVID-19 infection, though based on state law it is each individual's choice.

To help preserve our in person learning environment, the university recommends the following:

- **Vaccinations are widely available**, free and not billed to health insurance. The vaccine will help protect against the transmission of the virus to others and reduce serious symptoms in those who are vaccinated. The vaccines are safe, and effectively prevent against severe illness from COVID-19.
- If you are experiencing any symptoms of COVID-19, please follow university guidelines here: https://healthyhorns.utexas.edu/coronavirus_exposure_action_chart.html, including getting tested. If you test positive, you should ***isolate yourself at home***. Contact the [Behavior Concerns and COVID-19 Advice Line \(BCCAL\)](#) to report your positive result. BCCAL can also assist you with isolation options, class absence notification or other support, and if you find out that you have a positive test for COVID-19.
- If you are experiencing any symptoms of COVID-19 ***do not come to class in person***. If you are well enough to attend via zoom, please do. If not, you can use one of your six drops.
- Visit protect.utexas.edu for more information.

Illness-related absences

We understand that illness often results in absences. This course has significant built-in flexibility, allowing you to miss up to five classes before your participation grade is impacted. Should your illness extend more than a week, please contact me, and you are encouraged to complete a [Class Absence Notification Form](#) through Student Emergency Services to provide illness documentation. Please do not share your medical information with me or the TAs. Since course requirements and flexibility will vary between classes, schools and colleges, you are responsible for understanding the expectations of your faculty members and any accommodations they offer.

Frequently Asked Questions:

Do you record the in-class lectures?

Yes! Although there is not much in-class lecturing, it may still be useful to review the video of our think-pair-share discussions, or the debrief after the lecture tutorials. This classroom unfortunately does not have Lectures Online, thus I will endeavor to remember to record via zoom on my computer. These will record my screen, and use the computer microphone to capture my voice. These will be available via the Zoom link on Canvas after the lecture. Note that this zoom is **not** available for synchronous class attendance - this is an in-person class only. I will also post a PDF of the lecture slides.

How do I succeed in this class?

The best way to succeed is to prepare and participate. Do the modules ahead of time, and take the time to watch them in full (and multiple times if needed). When in class, buy in and ***participate!*** The lecture tutorial book is *your* textbook and you are the author. If you don't work hard on it, you won't have it to study from!

How do I study for the quizzes?

- 1) Study the lecture tutorials. Don't just read them, re-do them! Cover your old answers, then check your new answers against them. Work in a group if you can!
- 2) Go over the in-class PDFs, and practice the think-pair-share questions.
- 3) Re-watch the relevant module videos, find concepts which you feel less secure on, find those concepts in the book, and read up.
- 4) Come to help sessions!!!

I missed a quiz, when can I make it up?

There are no makeup quizzes. The only exception to this will be:

- 1) If you have a major life event, **and you notify me ahead of time**. Depending on the situation, I may ask you to contact Student Emergency Services for assistance.
- 2) I am contacted by Student Emergency Services, and they request a makeup.
- 3) You are absent for a university-sponsored event, **and** you notify me ahead of time.

I'm sick, and can't come to class today, what do I do?

You don't need to email me! Stay home and get better (you can miss up to five classes, and still receive a full participation grade). Still do the module before class, and after class watch the video to see what you missed. Do the missed lecture tutorials, in a group if you can find some classmates, or on your own. If you have to miss multiple consecutive classes, please contact Student Emergency Services, and they will let me know if they feel you should be allowed to make up for missed participation.

I need to leave class early? How do I make sure I don't lose participation?

Participation is counted through InstaPoll. You will not receive credit for questions when you are not in class.

I forgot to turn in my project! Can I turn it in this afternoon?

No, late projects are not accepted. Don't let this be you, turn it in early!

Its two days before the moon journal is due, and I haven't started!

There's nothing I can do to help you. Don't let this be you - do this early in the semester!

I got a zero in the gradebook for something I did or turned in!

We can make mistakes when inputting 100+ grades! If you believe there is a mistake in the gradebook, stay calm, just send myself or a TA an email, and we'll investigate.

University Resources:

Academic accommodations (D&A): This class respects and welcomes students of all backgrounds, identities, and abilities. If there are circumstances that make our learning environment and activities difficult, or if you have medical information that you need to share with me, please let me know. I am committed to creating an effective learning environment for all students, but I can only do so if you discuss your needs with me as early as possible. I promise to maintain the

confidentiality of these discussions. Any student with a documented disability who requires academic accommodations should contact Disability & Access at 512-471-6259 (voice) or 512-410-6644 (Video Phone) as soon as possible to request an official letter outlining authorized accommodations (email: access@austin.utexas.edu). For more information, visit <https://diversity.utexas.edu/disability/>. *I am also happy to meet to discuss more.*

Counseling and Mental Health Center: Do your best to maintain a healthy lifestyle this semester by eating well, exercising, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful. If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. <http://www.cmhc.utexas.edu/individualcounseling.html>

The Sanger Learning Center: Did you know that more than one-third of UT undergraduate students use the Sanger Learning Center each year to improve their academic performance? All students are welcome to take advantage of Sanger Center's classes and workshops, private learning specialist appointments, peer academic coaching, and tutoring for more than 70 courses in 15 different subject areas (including Astronomy). For more information, please visit <http://www.utexas.edu/ugs/slc> or call 512-471-3614 (JES A332).

University and Course Policies:

Academic integrity: The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community. Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties. Ethical conduct is expected at all times. For example, answering Voting Questions to receive credit when you are not in class is unethical. Incidences of academic dishonesty will be reported to Student Judicial Services. For more specific information go to: <http://deanofstudents.utexas.edu/conduct/academicintegrity.php>.

You are responsible for understanding UT's Academic Honesty and the University Honor Code which can be found at the following web address: <https://deanofstudents.utexas.edu/conduct/standardssofconduct.php>

- **Sharing of Course Materials is Prohibited:** No materials used in this class, including, but not limited to, lecture hand-outs, videos, assessments (quizzes, exams, papers, projects, homework assignments), in-class materials, review sheets, and additional problem sets, may be shared online or with anyone outside of the class unless you have my explicit, written permission. Unauthorized sharing of materials promotes cheating. It is a violation of the University's Student Honor Code and an act of academic dishonesty. I am well aware of the sites used for sharing materials, and any materials found online that are associated with you, or any suspected unauthorized sharing of materials, will be reported to Student Conduct and Academic Integrity in the Office of the Dean of Students. These reports can result in sanctions, including failure in the course.
- **Class Video Recordings:** Class recordings are reserved only for the use of members of this class (students, TAs, and the instructor) and only for educational purposes and are protected under FERPA.

Recordings should not be shared outside the class in any form. Violation of this restriction could lead to Student Misconduct proceedings.

Plagiarism: As a research university, the University of Texas at Austin takes plagiarism very seriously. Do not risk getting involved in a plagiarism infraction - the consequences simply aren't worth it. Always cite your sources, and when in doubt consult a professor or librarian. You may also read more about plagiarism at the Student Judicial Services website: <http://deanofstudents.utexas.edu/conduct/academicintegrity.php>

Personal or Family Emergencies: If you experience a personal or family emergency (death in the family, protracted sickness, serious mental health issues) that prevents you from attending an exam or forces you to miss multiple days of class, you should contact Student Emergency Services in the Office of the Dean of Students <http://deanofstudents.utexas.edu/emergency/>. They will work with you to communicate with your professors and let them know of your situation.

Religious Days: A student who is absent from a class or examination for the observance of a religious holy day will be permitted to make up the missed work, if notice is given at least fourteen days prior to such an absence.

Core curriculum: This course may be used to fulfill three hours of the natural science and technology component of the university core curriculum and your successful participation addresses the following four core objectives established by the Texas Higher Education Coordinating Board: communication skills, critical thinking skills, teamwork, and empirical and quantitative skills.

Title IX: Beginning January 1, 2020, Texas [Senate Bill 212](#) requires all employees of Texas universities, including faculty, report any information to the [Title IX Office](#) regarding sexual harassment, sexual assault, dating violence and stalking that is disclosed to them. Texas law requires that all employees who witness or receive any information of this type (including, but not limited to, writing assignments, class discussions, or one-on-one conversations) must be reported. If you would like to speak with someone who can provide support or remedies without making an official report to the university, please email advocate@austin.utexas.edu. For more information about reporting options and resources, visit <http://www.titleix.utexas.edu/>, contact the Title IX Office via email at titleix@austin.utexas.edu, or call 512-471-0419.

Course Calendar:

Dates in ***bold italics*** will be asynchronous, with an optional work session in class for lecture tutorials.

	Dates	Topics	Assignments Due Before Class	Optional Reading	In-Class Lecture Tutorials or Activities
1	Aug 23 (T)	Introduction to Class		1.1-1.9	Scales (PDF)
	Aug 25 (Th)	Tour of the Universe			Ranking Tasks (PDF)
2	Aug 30 (T)	Motion of the Stars		2.1, 4.1	Position, Motion
	Sept 1 (Th)				
3	Sept 6 (T)	Motion of the Sun and Seasons		4.2	Path of the Sun
	<i>Sept 8 (Th)</i>				Seasons

	Dates	Topics	Assignments Due Before Class	Optional Reading	In-Class Lecture Tutorials or Activities
4	Sep 13 (T)	Moon Phases		4.5	Cause of Moon Phases
	Sep 15 (Th)		Project #1: DEI in Astronomy		Predicting Moon Phases
5	Sep 20 (T)	Models of the Universe		4.7, 2.2, 2.4, 3.1, 3.4	Observing Retrograde Motion, The Parsec
	Sep 22 (Th)				Kepler's 2nd and 3rd Law
6	Sept 27 (T)	Newton, Nature of Light, Atoms & Spectra		3.2, 3.3, 5.1-5.5	Newton's Laws, EM Spectrum
	Sept 29 (Th)				Blackbody Radiation, Analyzing Spectra
7	Oct 4 (T)	Climate Change Part 1	News Item #1	8.3, 8.4	Greenhouse Effect
	Oct 6 (Th)	Exam #1			
8	Oct 11 (T)	Climate Change Part 2			---
	Oct 13 (Th)	Telescopes	Project #2: Moon Journal	6.1-6.6	
9	Oct 18 (T)	Stars		16.1-16.3, 17.1-17.3, 18.4, 22, 23.1-23.3	Apparent and Absolute Magnitudes, The HR Diagram
	Oct 20 (Th)				Star Formation and Lifetime, Stellar Evolution
10	Oct 25 (T)	Exoplanets		5.6, 21.3-21.6	Doppler Shift, Motions of Extrasolar Planets
	Oct 27 (Th)		Project #3: Anti-Science Movement		Detecting Exoplanets with the Transit Method
11	Nov 1 (T)	Milky Way and Other Galaxies		Chapters 25, 26	Milky Way Scales
	Nov 3 (Th)				Galaxy Classification
12	Nov 8 (T)	The Expanding Universe		26.5	Looking at Distant Objects
	Nov 10 (Th)		Project #4: Astronomical Obs.		Hubble's Law
13	Nov 15 (T)	Galaxy Evolution		Chapter 28	Expansion, Lookback Time and Distance
	Nov 17 (Th)	Mysteries of the Universe	Project #5: Citizen Science		---
	Nov 22-24	Thanksgiving			
14	Nov 29 (T)	Beginning/End Universe	News Item #2	Chapter 29	Making Sense of Universe, Big Bang
	Dec 1 (Th)	Exam #2			