

Course Syllabus

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AST 301 – Introduction to Astronomy

Unique ID: 47865

Spring 2023

MWF 2:00 PM – 2:50 PM

Instructor: Prof. John Chisholm

Email: chisholm@austin.utexas.edu (<mailto:chisholm@austin.utexas.edu>)

Help Hours: Mondays 11am - 12 pm (or by appointment) in PMA 17.212 or on this zoom:

<https://utexas.zoom.us/j/92630427113>  (<https://utexas.zoom.us/j/92630427113>)

Teach Assistant: Malvika Badrinarayanan

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Help Hours: Tuesdays from 12-1pm on Zoom

Teaching Assistant: Jatin Khare

Email: jatinkhare@utexas.edu (<mailto:jatinkhare@utexas.edu>)

Help Hours: Thursdays from 11:30-12:30 in PMA.

Desired Learning Outcomes

If you have ever looked up at the night sky from a dark spot you will immediately see why astronomy is the oldest science. The sense of wonder about the origin of those twinkling lights have inspired civilizations across the globe and time to wonder “What am I seeing?” and “How did the Universe unfold to lead to me?” These questions have driven humans to explore both physically and mentally what fundamentally shapes the Universe around them. To understand our origin story.

In this class, we will explore what we know about the origin of the solar system, stars, galaxies, and the Universe as a whole through the lens of exploration and scientific discovery. We will uncover the physical understand that collective humanity has developed to comprehend the Universe around us, but we will pay close attention to, and demystify, the actual discovery process. You will explore for yourself the mysteries of the Universe and discover our current paradigm of the Universe.

This course carries the Quantitative Reasoning flag. Quantitative Reasoning 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. We will often explore how astrophysics can be related to our every day lives.

This course is divided into three parts

1. History of Astronomy and the foundations to understand the Universe
2. The Solar System, other planets, the Sun, and other stars
3. Galaxies, the building blocks of the large-scale Universe, and the Big Bang

Each part aims to get you to reveal the mysteries of the Universe for yourself.

COURSE DETAILS

Meeting Information

We will meet Mondays, Wednesdays, and Fridays from 2-2:50PM in Welch Hall 3.502. There will not be an online component offered by default, but if you are not feeling well, please do not attend class and reach out to me or the Teaching Assistants for a possible recording. If you do not feel well, please email the TAs and me immediately and we will ensure that you receive the proper accommodations (extensions on homework/tests; class attendance **cannot** be made up). So please be kind to your fellow classmates.

Just to reiterate: the University [does have a policy](#) .

https://healthyhorns.utexas.edu/coronavirus_exposure_action_chart.html) for what you should do if you come down with COVID. Please isolate for 5 days after your symptoms and wear a mask for at least 10 days.

Canvas Course

Canvas is going to be your main resource for this course. Every announcement, homework and reading assignment, deadline, and grading will be done through the canvas environment. You will access your homeworks and tests in MasteringAstronomy through Canvas as well. This is also where you should ask questions to your fellow classmates. Check it often for announcements and familiarize yourself with how to use it. There is also a portal to the MasteringAstronomy course through Canvas, which is your gateway to using your text book.

Canvas Message Board

If you have a course-related question (not a personal question), please post first in the Canvas message board. One of your classmates or a teaching assistant might see it and respond with the solution. Have a conversation with them! Figure out the problem together. If after 6 hours no one has responded to your canvas message, please

send me an email and I will happily help you. There are over 180 students in the class and it becomes prohibitively challenging to answer all questions, but I am here for any questions that cannot be answered.

Class GroupMe

Malvika set up a class GroupMe account. I will not be on this, but it will provide you and your classmates an opportunity to ask each other questions about the class. Here is the link:

https://groupme.com/join_group/91301085/HNhxwYbf

Student Help Hours

If you have questions about material or want to better understand a particular subject, come to our help hours either on Zoom or in-person! We are here to help you on your journey to understand the cosmos.

Course Materials

This course requires three different materials (although 2 are bundled together):

1. *The Cosmic Perspective*, Edition 9; by Bennett, Donahue, Schneider and Voit
2. [MasteringAstronomy](https://mlm.pearson.com/northamerica/masteringastronomy/)  (<https://mlm.pearson.com/northamerica/masteringastronomy/>)
3. [Stellarium](https://stellarium.org/)  (<https://stellarium.org/>)

The Cosmic Perspective

The Cosmic Perspective is in its ninth edition and contains a wealth of beautiful figures and diagrams. It has a ton of updated information and many practice problems.

Each lecture is paired with 5-20 pages of reading from *The Cosmic Perspective* and (1) listed at the end of this syllabus, (2) linked on the Canvas Course page, and (3) posted in the MasteringAstronomy calendar. You will greatly benefit if you do this reading **before** lecture. That way you will be able to come to class ready to discuss the content we cover.

This semester we are using the Longhorn Textbook Access (LTA) version of this textbook. This service provides you with the eText of *The Cosmic Perspective* and MasteringAstronomy for \$60.67. That is half the sticker price for the combination. This does mean that you will **not** have a physical copy of the book. **I HIGHLY RECOMMEND THAT YOU PARTICIPATE IN LTA.** That doesn't mean it's required, but you won't find a better deal for the book plus Mastering software, and it will dramatically simplify your life.

You are automatically opted into the LTA program but can easily opt-out (and back in) via Canvas through the 12th class day (January 25th). **Again I highly recommend that you opt in for LTA**, past semesters experience quite a bit of issues that ended up being very hard for students to navigate. If you remain opted-in at the end of the 5th class day (January 17th) you will receive a bill through your "What I Owe" page and have until the end of the 20th class day (February 6th) to pay and retain access. If you do not pay by the 20th class day, you will lose access to the materials and your charge will be removed. To summarize, students have the ability to opt-out (or back in) from class days 1 through 12. All students opted in on the 5th class day will be billed through their "What I Owe" account but can still opt-out through the 12th class day (any charges after the 5th class day would be removed). Students have through the 20th class day to pay in your "What I Owe" account. More information about the LTA program is available at <https://www.universitycoop.com/longhorn-textbook-access/> 

[\(https://www.universitycoop.com/longhorn-textbook-access\)](https://www.universitycoop.com/longhorn-textbook-access/)

Summary: Everyone will be automatically billed for the book by January 17th. You can opt-out at any time through Canvas (although I recommend that you don't. You must pay the bill by February 6th to continue access to the book.

MasteringAstronomy

MasteringAstronomy pairs *The Cosmic Perspective* with Canvas. It allows the class to be done completely online. MasteringAstronomy is your portal to find reading assignments, homework and group work, and tests. You can also access the eText version of *The Cosmic Perspective* through MasteringAstronomy. It is a crucial component to the class.

Make sure that you sign up for MasteringAstronomy immediately.

You can set up your MasteringAstronomy by going to the “My Textbooks” section of our Canvas Course. If you click on “My Textbooks” it will bring you to a UT Coop page. If you click on “Launch Courseware” it will bring you to a Pearson website. Click on “Open MyLab and Mastering” and it will open a page for you to register. You will need to create an account if you are new to MyLab and Mastering. Once you create an account you will be able to select an available access option and access our Course Content.

You will need to buy access to MasteringAstronomy at the time that you sign up for the course. The LTA version of the textbook comes with Mastering included, and you should have access to it right away. If you choose to opt-out of the LTA program, there should be a free two-week trial period for MasteringAstronomy, that will enable you to access the course content immediately if you are waiting for financial aid. Again, please make sure that you sign up for MasteringAstronomy immediately.

Stellarium

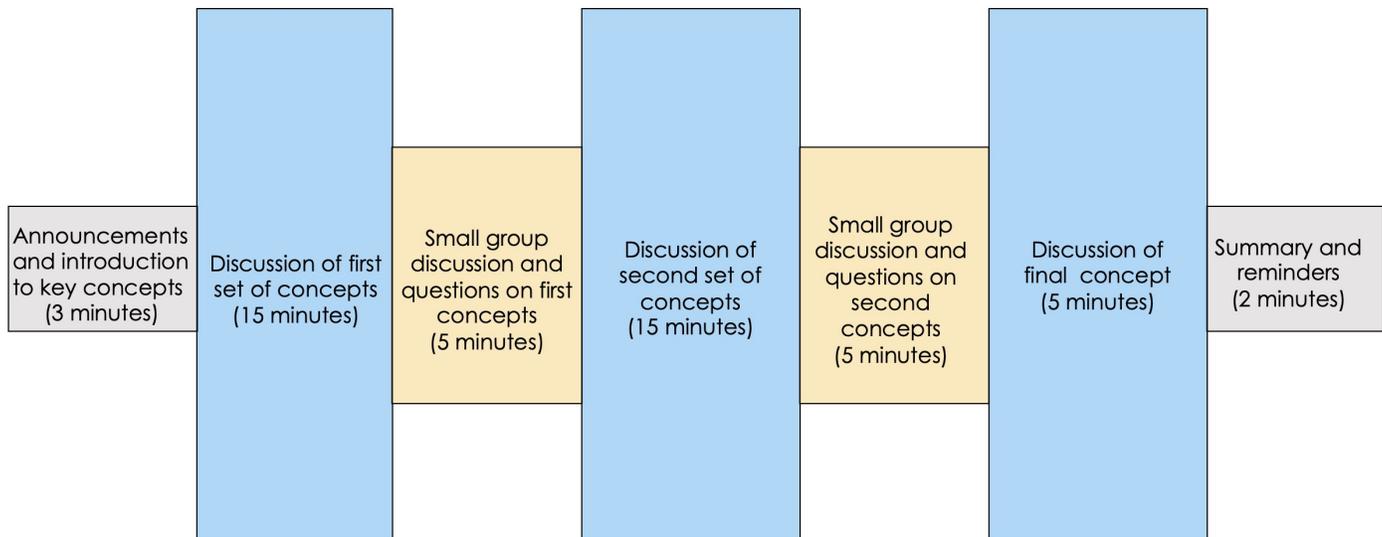
Stellarium is a *free* virtual planetarium software that we will pair with MasteringAstronomy to do group labs. You can download the free version of the software [here](https://stellarium.org/)  (<https://stellarium.org/>). I recommend downloading the software onto your computer because the web-based version does **not** have all of the functionality that we will use.

We will have a walk through of some of the functionality of Stellarium on the first day that we use it, but I encourage you to explore the many good YouTube videos available that show some of Stellarium’s functionality.

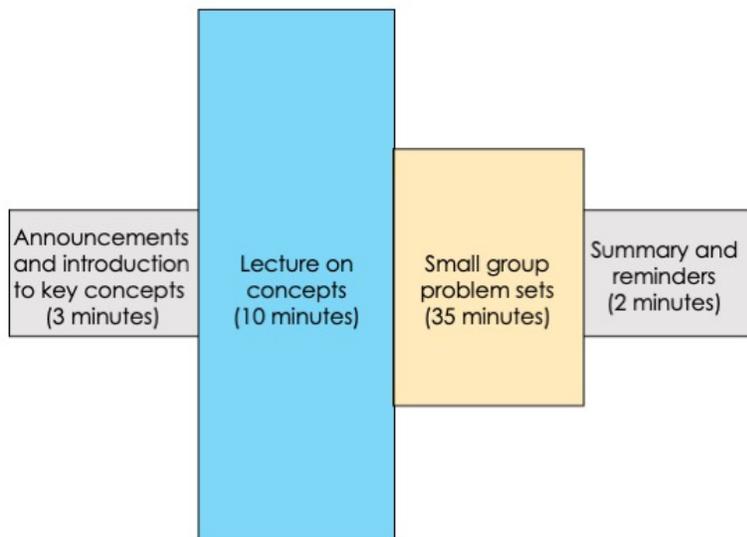
COURSE DETAILS

We will have two distinct different types of lectures. Both structures aim to get you taking ownership over your exploration of Astronomy. There will be substantial amount of class time where you are talking about the mysteries of the Universe with your classmates, the Teaching Assistant, and me!

Mondays and Fridays we will have a somewhat typical lecture format. I will start each lecture with announcements and an introduction to our key concepts. The core of the lecture will include three different “blocks” where I elaborate on the concepts that you read about before the lecture, and two blocks where you answer questions from [Kahoot](https://kahoot.it/)  (<https://kahoot.it/>) or discuss these concepts in small groups of 3-4 classmates. The Teaching Assistants and I will walk around to help answer questions during the discussion blocks. The lectures will then conclude with a summary and any reminders. The flow should look something like this:



Wednesdays will be less focused on lecturing and more focused on group problem sets and online labs where you will explore the Universe for yourself. The structure of those classes will look like



Every day will include some problem sets that you will answer in MasteringAstronomy for extra credit. Through Kahoot we will be polling each other and helping each other explore the answers to the various questions we ask during the semester.

Required reading

A crucial component of this class structure is that you must be ready to discuss with your classmates. Coming prepared for class is crucial. Doing the pre-class reading is the best way to prepare. The required reading is listed in the schedule below, linked on Canvas, and posted on the MasteringAstronomy calendar. The required reading is typically between 5-20 pages and usually contains helpful diagrams.

In Class Participation

The mysteries of the cosmos are everyone's to pursue and understand. I truly believe that the best way to achieve this is to actively participate with your fellow human. This is exactly how the mysteries of the Universe have been uncovered in the past. There will be three types of interaction that you should come prepared to actively participate in class with:

- 1. Kahoot Questions During Lecture** In my lecture blocks, I will ask you questions. In order to assess everyone's understanding in realtime, we will use Kahoot, which can be accessed through your phone or on your computer to answer these questions. Have fun with this and keep yourself engaged in what we are doing. The in-class participation question will be paired with the ability to discuss the question with your neighbors to check your understanding. We will do the Kahoots anonymously, but feel to come up and grab some candy after class if you think that you preformed especially well. The Kahoots (along with the slides used in class) can be found in the Kahoot folders linked in the Pages tab of Canvas. I will continually update the Kahoot folder throughout the semester.
- 2. Group Discussions and Problem Sets** Between lecture blocks there will be 3-10 minutes for you to talk with people in the class to work through a couple homework problems. On Wednesdays you will have larger breakout sections to do labs together. Take advantage of these times. Talk through the problems and help each other understand the problems. Make sure that **everyone** in your group understands the problem. You will find that you do not truly understand the Universe until you have to teach someone else about it (teaching you about planetary atmospheres is the only way I will learnt about them!). As such, helping someone understand the problem will do just as much to help you in this class as it will them. Give it a try.
- 3. Canvas Message Board** If you have a question outside class, ask it on the Canvas Message Board. If you see a question on the Canvas Message Board that you know the answer to, help someone out and explain it to them. You will be amazed at how much you learn when you teach someone.

Grading Breakdown

Your total grade for this class will be a combination of three components:

70% Homework Assignments (2% per assignment)

30% Three take-home, open book tests (10% per test)

Up to 4% extra credit for in-class participation (0.1% per class)

Letter grades will be assigned as

A: 94.00 – 100%	B-: 79.00 – 82.99%	D+: 67.00 – 70.99%
A-: 91.00 – 93.99%	C+: 76.00 – 78.99%	D: 63.00 – 66.99%
B+: 87.00 – 90.99%	C: 73.00 – 75.99%	D-: 60.00 – 62.99%
B: 83.00 – 86.99%	C-: 70.00 – 72.99%	F: 0.00 – 59.99%

Everything will be rounded to the nearest hundredth (0.01%). This means that a 90.993% will receive a B+ and a 90.996% will receive a A-.

When looking at your grade, please look at your grade in both Mastering and Canvas. Sometimes Canvas can be out of sync. Canvas also unfortunate defaults that display the grade assuming that you have not missed any

assignments. If you have missed assignments this will make you think that you are doing better than you actually are doing.

Homework Assignments

There will be 35 homework assignments, each worth 2% of your final grade, that will be posted on MasteringAstronomy. All homeworks will be worth 10 points. Assignments will be due at the **start of every class except test days and the days after tests**. The homework assignments are listed in this syllabus and will be clearly marked a week ahead of time in MasteringAstronomy. Homework submission closes at **1:59 PM** on the due date (the day the assignment is listed on the schedule below).

The late homework policy will subtract 20% from your final grade for every day that the assignment is late. After five days submitting the assignment will not result in any credit.

The homework assignments, and how much you will have to do outside of class, will largely vary upon the day:

- **Homeworks that are due on Mondays and Wednesday** will mainly be take home problems covering material that we discussed on Friday and Monday.
- **Homeworks that are due on Fridays** will completely be problems that we do together in-class and submitted through MasteringAstronomy. If you are not able to complete the assignments with your group during class on Monday, you still have until the start of class on Wednesday to complete and submit the assignment.

Don't worry, I will remind you in class and on Canvas what is due and when.

For all MasteringAstronomy homework assignments you will have two chances to submit the correct answer. If you initially submit the wrong answer, MasteringAstronomy will give you a hint and allow you to change your answer. Try to learn from this and do not just guess.

To summarize: Homeworks will be **due by 1:59 PM for each class**. You can still receive partial credit for late work, but the maximum possible credit reduces by 20% every day. This will happen automatically. No homework will be due on test days or the class after tests.

Exams

All exams will be open note and will be taken within MasteringAstronomy. Each exam will be worth 10% of your total grade, or 50 points per test. It will be timed so that you will have 50 minutes to take each exam. The exams will open immediately after the class that we review the material and will stay open until the start of the class (1:59 PM) after the class designated for the test. This means that you will have at least 5 days to take the test. To accommodate your busy schedules, we will **NOT** have class on test days. This gives you the option of when to take the test: during our normal class time or any other 50 minutes during the 5 days that the test is open. There is **no** cumulative final.

You are expected to do tests by yourself and not in groups. This means that there should be no collaborative work on tests and each individual should take their own test.

Exam questions will be similar in content and spirit to homework and group work questions. If you review and understand the problems that we did for homework, you will do great on the tests.

Extra Credit -- In class participation

Every class there will be one conceptual question that you will have to answer and place into Mastering. I will let you discuss this question with your classmates to make sure you answer the question correctly. The question will **only**

be open during the class, so you must input your answer before the end of class. You will receive 0.5 points (0.1%) **extra credit** for answering each question. This means that attendance is completely **optional**, but if you attend all the lectures you will receive enough points that you can miss two homework assignments and still receive a 100% final score. You will not receive makeup attendance credit regardless of the legitimate excuse for missing class.

Expected behavior

Our pursuit of the understanding of the Universe is a timeless and age-old question. This is a pursuit that everyone should feel comfortable to explore. This means that we aspire to create an environment that is free from bullying, harassment, and micro-aggressions. As such, there will be a **zero-tolerance** policy for this behavior. This is especially true during our group work and discussions. If there is ever an issue please do not hesitate to bring it to my or the Teaching Assistants attention and we will pursue it to the fullest extent of University policies. The bottom line: Everyone deserves respect and I expect you to treat everyone with respect.

While much of this class involves group work, tests are a personal experience. Any indication about academic dishonesty will result in an automatic zero on the assignment. Depending on the situation, I reserve the right to pursue any act of academic dishonesty to the furthest extent of University policy, including but not limited to failure of the class and being reported to Student Judicial Services in the Dean of Students Office. In this case, Judicial services will determine the final penalty.

Mental Health Resources

The past two years (and counting) have been extremely stressful and trying times. Extreme isolation, illness, and loss of family and friends have caused many of us to revisit the important impacts that mental health can have on our learning and well-being. Your teaching assistants and I are here to help you with any aspect of your exploration of the Universe, so please come to us if you are having mental health issues and we will listen. However, we are not trained counselors. The University does provide mental health support through the Counseling and Mental Health Center. They have a website (<https://cmhc.utexas.edu/> ) where you can access confidential virtual counseling services free of charge. There is also a 24-hour crisis hotline (512-471-2255) where you will immediately be put into contact with someone. You have people in your corner that are always here to support you

Disability and Access: Help with accommodations

I am committed to make the pursuit of astronomy accessible to everyone in this class. If there are any particular parts of this class that are challenging for you, please let me know as soon as possible so that I can assist you with this. I will keep all requests confidential.

Any student with a documented disability who requires academic accommodations should contact [Disabilities and Access \(D&A\)](#)  (<https://diversity.utexas.edu/disability/how-to-register-with-ssd/>) and fill out [this qualtrics form](#)  (https://utexas.qualtrics.com/jfe/form/SV_8pEFQipZiaQ77St?Q_JFE=qdg) as soon as possible to request an official letter outlining authorized accommodations. These accommodations can range from help taking notes in class to extra time on exams. My goal is to do everything that I can to help you learn the material. More information is available on the Services for Students with Disabilities website at

<https://diversity.utexas.edu/disability/accommodations-and-services/> 

[\(https://diversity.utexas.edu/disability/accommodations-and-services/\)](https://diversity.utexas.edu/disability/accommodations-and-services/)

Questions

“How do I do well in this class?”

Inevitably you are interested in doing well in this course. The best advice I have for you is give in to your curiosity and let yourself dive into the subject. Too vague? 70% of your grade is homework and group work. If you show up every day to class you will receive 4% extra credit, and you will be 75% of the way to getting an A. The next 25% comes from tests. The best way to prepare for tests is to review the material we covered for homework and group work. The tests cover the same exact material as the homeworks. I promise. If you are comfortable with what we did (especially what I emphasize in class), you will be prepared for the tests. If you have questions about the homework assignments, come to Help Hours and ask questions.

“Will the lectures be recorded and posted online?”

I will post the lecture PDFs after class. The recorded lectures will not be distributed except for special circumstances. Please, send me an email or come to Help Hours if you would like to discuss recordings.

“This class is heavy on technology, where can I find IT support?”

It's true that I am asking a lot of technology for this class. Homeworks are assigned and collected online. Tests are taken all online. There is quite the heavy burden on being able to access and understand the electronic platform. However, the class grade is **not** supposed to be about exploring computer issues. Leave plenty of time to take tests. Waiting until 1:00 PM on the day the test is due is asking for MasteringAstronomy to crash, so just take it earlier. If you are having issues answering the in class extra credit, please come up to me **after class** and I will write down your name to make sure you receive the extra credit.

We will accommodate *reasonable* technological issues. I especially understand and recognize that computers are not uniformly available for all UT students. Since you have the option of doing the homeworks and group work on your own, explore the option of computer labs on campus. The University also has funds available for students in financial need to help address technological needs. Please check [this website](https://cns.utexas.edu/students/support/student-emergency-funding)  [\(https://cns.utexas.edu/students/support/student-emergency-funding\)](https://cns.utexas.edu/students/support/student-emergency-funding) for more information. If you have further issues accessing computers, please come to us and we will do whatever we can to get you online. If you have trouble accessing your MasteringAstronomy or Canvas passwords or usernames, there is not much I can do. Please contact either Mastering or Canvas directly. If you are having issues with software or accessing the electronic content of the class you have a couple options: (1) post on the Canvas message board, or (2) email the Teaching Assistants or me. Your fellow students and instructors will do their best to help you.

“Will there be math?”

Astronomy and physics are deeply rooted in math. It is our only way to know what we know about the Universe around us. Further, this class does satisfy your quantitative requirement, so we are definitely going to get quantitative. However, this course is not intended to strongly stretch your math skills. There definitely **will** be math, but it is all math that you have seen before in high school. Very little algebra, no calculus. Don't worry about those. There are five types of math that we will be doing:

1. Interpreting equations and calculating values
2. Significant figures
3. Using units
4. Scientific Notation and understanding large numbers
5. Interpreting graphs

The first of these involves being familiar with putting numbers into equations. For instance if I tell you $x = a + b$ and give you a and b you will be expected to determine what x is. Similarly, if I ask you “if I increase a , and keep b constant, what will happen to x ?” you should be able to answer it.

Significant figures are important when answering homework questions. What is a significant figure? A significant figure is a digit that can be accurately estimated. We will go over in class how you can determine which ones to use.

Units are important to understand the values we estimate. The difference between an inch and a mile can be catastrophic! But you use units in your daily life. When you go to the doctor’s office and they tell you your height in feet and inches, that provides you a sense for how tall you are. Similarly, when we discuss that the nearest star outside our solar system is 4.26 light years away, you should be comfortable to convert that to meters by knowing that 1 light year is 9.4×10^{15} m. It just requires doing:

$$4.26 \text{ light years} \times \frac{9.4 \times 10^{15} \text{ m}}{1 \text{ light years}} = 4 \times 10^{16} \text{ m}$$

As that last part demonstrated, Astronomy deals with numbers that are beyond our normal, every-day understanding. As such, we will have to get used to *scientific notation*. 10^3 is the same as 1,000, but you wouldn’t be happy if I asked you to write out all the zeros in the distance to the nearest star (4×10^{16} m, yes that is 4 followed by 16 zeros). Scientific notation makes our pursuit of Astronomy way less of a typing/writing exercise!

The fourth math topic involves looking at a graph and determining the relationship between two variables. This skill will help you understand how we can interpret the Universe around us, and is highly transferable to your daily life.

Our first few homework assignments will include summaries of these basic math ideas for you to refamiliarize yourself. You will not be asked to do heavy algebra or calculus, nor will you be asked to derive things. However, the above math skills are crucial to understand *how science works* and *how we understand the Universe*.

Course Schedule

CLASS NUMBER	DATE	TOPIC	HOMEWORK DUE	
			PRECLASS THROUGH MASTERING ASTRONOMY	Preclass Reading
1	M Jan	Introduction	--	--

9th

2	W Jan 11 th	Scale of the universe and its timeline	· Intro to Mastering Astronomy	· Syllabus · Ch 1.1 & 1.2
3	F Jan 13 th	The motion of the stars, causes of the seasons, and the moon	· Ch 1.1 & 1.2 · Powers of 10	· Ch 2.1-2.3
4	W Jan 18 th	The history and development of Astronomy	· Ch 2.1-2.3 · Units	· Ch 2.4-3.3
5	F Jan 20 th	In Class Lab and Group Work: Motion of the Stars	Ch 2.4-3.3	Preclass videos to watch
6	M Jan 23 rd	What is science? Describing motion and Newton's Laws	· In class Group work on Stellarium	· Ch 3.4, 4.1, 4.2
7	W Jan 25 th	Conservation laws, gravity and orbits	· Ch 3.4, 4.1, 4.2	· Ch 4.3-4.5
8	F Jan 27 th	In Class Lab and Group Work: Measuring the mass of Jupiter	· Ch 4.3-4.5	
9	M Jan	Properties of light	· In class group work on	· Ch 5.1 & 5.2

30th

Stellarium

		Using light to determine the properties of matter	· Ch 5.1 & 5.2 · Ch 5.3 & 5.4
10	W Feb 1 st	(No group work this week)	
11	F Feb 3 rd	Exam Review	· Ch 5.3 & 5.4 · Exam 1 goes live after class
12	M Feb 6 th	EXAM 1: Basics of the Universe, Ch 1-5	· No class. Remember to take exam!
13	W Feb 8 th	An introduction to the Solar System (No group work this week)	· Exam 1 closes at start of class · Ch 7.1-7.3
14	F Feb 10 th	Formation of the Solar System	· Ch 7.1-7.3 · Ch 8.1 & 8.2
15	M Feb 13 th	Formation of the Solar System	
16	W Feb 15 th	Planetary Geology	· Ch 8.1 & 8.2 · Ch 9.1 – 9.2

stars and the
H-R Diagram

		In Class Lab	
25	F Mar 10 th	and Group Work: The H- R diagram	• Ch 15.1 and 15.2
		Spring Break	
26	M Mar 20 th	The lives of stars	· Ch 17.1-17.3
27	W Mar 22 nd	White Dwarfs, neutron stars, Black holes	· Ch 17.1-17.3 · Ch 18.1-18.2
28	F Mar 24 th	(No group work this week)	· Ch 18.1-18.2 · Ch 18.3&18.4
29	M Mar 27 th	EXAM 2 REVIEW	· Ch 18.3 & 18.4 · Review · Exam 2 goes live after class
30	W Mar 29 th	EXAM 2: Stars and planets: Ch 7-18	· No class. Remember to take exam! · None
31	F Mar 31 st	In Class Lab and Group Work: Revealing the shape of the Milky Way	· Exam 2 closes at start of class · Ch 19.1& 19.2

32	M Apr 3 rd	The history and evolution of the Milky Way	· Ch 19.1& 19.2	· Ch 19.3&19.4
33	W Apr 5 th	Types of Galaxies	· Ch 19.3 & 19.4	· Ch 20.1
34	F Apr 7 th	The distances to other galaxies and the age of the Universe	· Ch 20.1	· Ch 20.2&20.3
35	M Apr 10 th	Galaxy Evolution	· Ch 20.2 & 20.3	· Ch 21.1&21.2
36	W Apr 12 th	The Big Bang Theory	· Ch 21.3	· Ch 22.1&22.2
37	F Apr 14 th	The Cosmic Microwave Background	· Ch 22.1&22.2	· Ch 22.3
38	M Apr 17 th	Dark Matter	· Ch 22.3	· Ch 22.3 & 22.4
39	W Apr 19 th	Dark Energy and the fate of the Universe	· Ch 22.3 & 22.4	Ch 23.1-23.3
40	F Apr 21 st	Life in the Universe	· Ch 22.3 & 22.4	· Ch 23.1-23.3
41	M Apr 24 th	Exam 3 Review	· No homework assigned.	· Review

· Exam 3 goes
live after class

· No class.
Remember to

EXAM 3:
Galaxies and
Cosmology
Ch 19- 24

take exam!
· Exam 3
closes at 2
PM on Apr
28th

Course Summary:

Date	Details	Due
Wed Jan 11, 2023	 HW #1: Introduction to Mastering Astronomy (https://utexas.instructure.com/courses/1351787/assignments/6190289)	due by 1:59pm
	 Class 2 Participation (https://utexas.instructure.com/courses/1351787/assignments/6220548)	due by 2:30pm
Fri Jan 13, 2023	 HW #2: Section 1.1 and 1.2 (https://utexas.instructure.com/courses/1351787/assignments/6220547)	due by 1:59pm
	 Class 3 Participation (https://utexas.instructure.com/courses/1351787/assignments/6224515)	due by 2:30pm
	 Read 2: Discovering the Universe for Yourself (https://utexas.instructure.com/courses/1351787/assignments/6208019)	due by 11:59pm
Wed Jan 18, 2023	 HW #3: The sky, the moon and the seasons (https://utexas.instructure.com/courses/1351787/assignments/6224516)	due by 1:59pm
	 Read 3: The Science of Astronomy (https://utexas.instructure.com/courses/1351787/assignments/6208017)	due by 1:59pm
Mon Jan 23, 2023	 Watch: The celestial sphere and reason for the seasons and (https://utexas.instructure.com/courses/1351787/assignments/6224514)	due by 1:59pm
	 Read 3: The Science of Astronomy (https://utexas.instructure.com/courses/1351787/assignments/6208018)	due by 1:59pm

Date	Details	Due
	 Read 4: Making Sense of the Universe: Understanding Motion, Energy, and Gravity (https://utexas.instructure.com/courses/1351787/assignments/6208016)	due by 1:59pm