

AST 301: INTRODUCTION TO ASTRONOMY

Course Syllabus

Unique# 46568 Fall 2020

Course and Contact Information

Instructor: Dr. Michael Endl e-mail: mike@astro.as.utexas.edu (best way to communicate with me!)	Teaching Assistants: Mona Sachdev: mona.sachdev@utexas.edu Vishesh Khanna: visheshkhanna@utexas.edu
Lecture Hours: Tu,Th 9:30 AM-11:00AM	Lecture Location: online (Zoom)
Office Phone: 512-471 8312	Office Location: PMA 17.328
Office Hours: online via Zoom (per appointment, almost any time works) TAs: online via Zoom per appointment	
Course Website: CANVAS (http://canvas.utexas.edu)	

Basic Course Information

Course Description

This semester you will go on a *journey to the planets, stars and galaxies*. This course will provide an overview of astronomy, including the basic physical concepts. The design of the course will focus on conceptual understanding, rather than memorization of facts. You will learn how science works, develop critical thinking skills, as well as gaining an appreciation for the universe we live in. You will also learn about the importance of the continued scientific study of the cosmos. There are no prerequisites for this course. The concepts will be primarily qualitative, but there will be some little amount of (high school-level) algebra in the course. **This course is 100% online, we will use the conferencing tool Zoom (accessible from our Canvas website) to take this journey through the Universe.**

Prerequisites and Core Requirements:

This course has no prerequisites. AST 301 is intended to meet the requirements for the Core Component Area Natural Science and Technology and may be combined with AST 309G, 309L, 309N, 309R, or 309S for a six-hour Core sequence. This course will include work designed to develop skills in critical thinking, communication, quantitative analysis, and teamwork. This will involve such activities as discussions, in-class teamwork to solve mini-quizzes and critical analysis of key concepts, and quantitative problem solving. Communication in the course will consist of student questions and subsequent classroom discussions during lectures and homework assignments. The course material will emphasize the synthesis of observation and theory to gain

insight into the operation of the natural world, drawing on other fields such as physics, chemistry, geophysics and biology. The mathematical skills required to solve the problems in this course do not exceed high school algebra level.

Class Website:

This course will be run through the Canvas system at canvas.utexas.edu. All class activities and communications (lectures, exams, in-class activities (instapolls), homework assignments, etc.) will be done through Canvas.

Required Texts/Materials

- *“Astronomy”* by OpenStax (Senior Contributing Authors: Fraknoi, Morrison, Wolff)
This is a relatively new and **free** textbook for astronomy that you can download here:
<https://openstax.org/details/books/astronomy>
- Scientific calculator for use on (occasional) problems

Grading System:

5 Exams (online)	60%
Homework	20%
In-class activities (Instapolls)	15%
Discussion Board	5%
Extra Credit (not required)	(3%)
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	100%

This class will not be graded on a curve. The percentage in each of these grade components will be added by the above percentages to derive the final course grade, which will be assigned as follows (where the numbers represent the percentage of total points):

93–100 = A	90–92.9 = A–
87–89.9 = B+	83–86.9 = B
80–82.9 = B–	77–79.9 = C+
73–76.9 = C	70–72.9 = C–
67–69.9 = D+	63–66.9 = D
60–62.9 = D–	< 59.9 = F

Your grades will be posted on Canvas during the semester.

Grades are **non-negotiable**. These are the grades that **you** earn (and are not “given” by the instructor). Follow your progress over the semester in the grade center on Canvas and check if you will meet your goals. Talk to the instructor or TA if you have questions regarding your progress. *There is no last-minute extra credit.* There is ample opportunity for extra credit during the semester to improve your grade. Please read this syllabus carefully, it is your responsibility to be aware of all the requirements to achieve a certain grade. *Note that the running percentage on Canvas during the semester is not necessarily an exact proxy of your final grade, as some grade components will only be entered at the end of the course!* When in doubt, please contact me or one of the TAs!

Course Policies:

- Online Teaching:

This class includes required virtual live class meetings on the days and times listed. Students must be able to attend virtual class meetings in real time. You must have the following things to succeed in an online class:

- Reliable access to a working computer, laptop, or tablet
- A computer with a webcam and a microphone is recommended
- Basic computer skills, such as creating and formatting documents, uploading and downloading documents
- Access to reliable (preferably high speed, broadband) internet service

(Access to a printer is useful but not required)

We will use the online conferencing tool Zoom to meet virtually. You can launch Zoom from our Canvas website. We will meet in our regular class hours Tuesday and Thursday at 9:30-11:00am. All lectures will be recorded and the recordings will be available on Canvas. You are free to re-watch these at any time after the class. I will also post all my lecture slides on Canvas. *These lecture slides and your lecture notes are your primary source of information in preparing for the exams.*

During each lecture, I will describe and explain the important concepts of each chapter. Every 15 to 20 minutes or so we will take a break from lecturing and do an in-class activity. These activities will help you digest and review the material and help to deepen your understanding of the concepts. This is an introductory astronomy course for non-science majors, so we will focus on conceptual understanding. Any quantitative problems will not require math that exceeds your high school algebra level. After about 45 minutes we will take a 5-minute bathroom break. Each class meeting will cover about one full lecture/chapter, or sometimes one and a half lectures/chapters.

- Exam policies:

There will be 5 online exams throughout the semester, each exam is worth up to 12% of your final grade. There is no comprehensive final exam. Note the test dates in the course calendar and please enter them in your personal calendar. We conduct all tests during nominal lecture hours using Canvas. *All tests will be multiple-choice tests.* The TAs and myself will support and proctor the exams via Zoom. You will need to have your webcam activated during the exams. This will also give you the ability to ask any questions, if something is unclear.

There are 5 modules to our course (see course calendar). **The questions on each test will quiz you on the major concepts that we discuss in the module leading up to the test.** Except for general fundamental concepts (like the concept of gravity, light, etc), each test will cover only the material in the section since the last test (i.e. in test 2 you will not be quizzed in detail on section 1, and so on....). Also, you will not be tested on anything that I did not cover during the lectures, or was subject to homework assignments. However, I encourage you to read the complete chapters of the textbook, also the sections I did not cover, for an improved understanding of the course material.

Exam re-weighting: since everyone can have a bad day or other troubles arising during a full semester, I will re-weigh your exam grades at the end of the semester. Your best test will be upgraded to account for up to 18 points and your lowest test score will only account for up to 6 points. Example: your test grades are 88(/100),77,54,67,91. So your total exam grade will be: $88\%*12 + 77\%*12 + 54\%*6 + 67\%*12 + 91\%*18 = 47.5$ (out of 60) compared to 45.2 without reweighting. Obviously, this can only be done at the end of the semester.

In-class activities: during lectures we will frequently perform small in-class activities (2-5 mins) to deepen your understanding of the material covered that day. You can use textbook, lecture slides and the internet to complete the activity. We will use *instapoll* on Canvas or other online tools to do these activities. All submitted and correct answers will count for your *in-class activity* score (15% of your final total). **If you answered 70% of all instapolls correctly you will get the whole 15 points.** If you have less than 70% correct, the points will be adjusted accordingly. We will do all Instapolls during our regular Zoom classes.

Never hesitate to ask a question in the classroom (there are no stupid questions in my course, in fact those questions perceived to sound stupid, often are the most interesting!). **Zoom has an option to virtually raise your hand. I will respond in the order that they were raised.** Just raise your (virtual) hand and I will react. Also, please speak up whenever I ask a question to the classroom. If you have heard some interesting astronomy news, please also share them with our class

The course webpage on the Canvas system will be updated with course announcements, homework assignments, and deadlines. *It is your responsibility to check these on a regular basis.* Please come to class prepared to participate in in-class discussions and activities, this is for your benefit.

Cell phones: please silence and pack away your cell phone **during Zoom classes.** Please be considerate.

- Homework Policies: each week you will receive one homework assignment (starting with week 2). The assignments will be posted on Canvas and are typically due at the end of each week (including the weekends). No late homework will be accepted (unless in documented medical emergencies)! I encourage discussions and collaborations between students. Please do not hesitate to ask me if something seems unclear. Doing the homework is essential for a better understanding of the course material and it is a sure recipe to be successful in this class. **The homework grade is important, as it constitutes up to 20% of your total grade.** Typically, we will post the hw on Canvas on Mondays and they are due the following Sunday, unless there is a test that week, in which case the due date will move, so that you can see the correct answers before the test. The questions on the tests will be very similar to the questions on the homework assignments!

- Discussion Board:

Canvas offers a *discussion board* that allows students to talk about course-related astronomy topics. **For the discussion board score (so 5 points for the total) each student is required to start one discussion topic and moderate it over the entire semester.** If you need help with Canvas just ask the TAs. It is not sufficient to post a link as a discussion, without any kind of explanation and/or justification why this is interesting for our course. We want to see why you chose this

subject and how you think this relates to our class. Occasionally, I will participate in these discussions. Also, the posts should be about interesting progress in astronomy and not course-related questions (e.g. about homework or exams). If you are in doubt about the topic you chose, just ask me. Since you are supposed to moderate your discussion post, **all posts need to be entered on Canvas before the semester midpoint (October 15th)**. Any discussion posts entered after this date will receive only half credit (up to 2.5 points for your total).

- Extra Credit

There will be many extra credit opportunities over the course of the semester. Each exam and homework assignment will contain bonus questions that will give you an opportunity to earn extra, additional points. **I want my students to learn and succeed.** The extra credit is – of course – not required to achieve 100% in this course.

I will post a special extra credit opportunity using the *Zooniverse* in the second half of the semester. This activity will allow you to gain up to **3 extra points** to your final total. Please keep track of your grade and be pro-active with extra credit if you want to improve. *There will be no extra-extra credit at the end of the course!* If you have any questions about your grade, just ask me or a TA.

- Instructor Absences: I am a professional research astronomer, *which might require absences during the semester*. I will do my best to minimize the impact of these activities, and will maintain email and Canvas communication at all times. When I cannot teach a lecture, another UT astronomy professor will lead the class in my place (using my slides and instructions) or we perform in-class activities directed by the TAs.

- Academic Dishonesty:

University of Texas Honor Code: 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, including the possibility of failure in the course and/or dismissal from the University. Standards for Academic Integrity are posted at <http://deanofstudents.utexas.edu/conduct/index.php>

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>

- Documented Disability Statement:

Please notify me of any modification/adaptation you may require to accommodate a disability-related need. The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact Services for Students with Disabilities at 471-6259 (voice) or 232-2937 (video phone) or <http://diversity.utexas.edu/disability/>

-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.

Course Outline/Calendar

(topics are subject to change, depending on overall progress, test dates are permanent)

MODULE 1:

- Week 1 – Aug 27: - Introduction/Welcome/Syllabus
 - Science and the Universe (chapter 1)
- Week 2 – Sep 1: - Observing the Sky: The Birth of Astronomy (Chapter 2)
 - Orbits and Gravity (Chapter 3)
- Week 2 – Sep 3: - Orbits and Gravity (Chapter 3 continued)
 - Earth, Moon and Sky (Chapter 4)
- Week 3 – Sep 8: - Earth, Moon and Sky (Chapter 4 continued)
- Week 3 – Sep 10: - Radiation and Spectra (Chapter 5)
- Week 4 – Sep 15: - Astronomical Instruments (Chapter 6)
- Week 4 – Sep 17: - TEST 1**

MODULE 2:

- Week 5 – Sep 22: - An Introduction to the Solar System (Chapter 7)
 - Earth as a Planet (Chapter 8)
- Week 5 – Sep 24: - Earth as a Planet (Chapter 8 continued)
 - Cratered Worlds (Chapter 9)
- Week 6 – Sep 29: - Venus & Mars (Chapter 10)
- Week 6 – Oct 1: - The Giant Planets (Chapter 11)
- Week 7 – Oct 6: - Rings, Moons, and Pluto (Chapter 12)
 - Comets and Asteroids (Chapter 13)
- Week 7 – Oct 8: - Comets and Asteroids (Chapter 13 continued)
 - Origin of the Solar System (Chapter 14)
- Week 8 – Oct 13: - TEST 2**

MODULE 3:

- Week 8 – Oct 15: - The Sun I (Chapter 15)
 - The Sun II (Chapter 16)
 - **All Discussion Board posts due**
- Week 9 – Oct 20: - The Sun II (Chapter 16 continued)
 - Analyzing Starlight (Chapter 17)
- Week 10 – Oct 22: - The Stars (Chapter 18)
- Week 11 – Oct 27: - Celestial Distances (Chapter 19)
 - Gas and Dust in Space (Chapter 20)
- Week 11 – Oct 29: - TEST 3**

MODULE 4:

- Week 12 – Nov 3: - Star Formation and Exoplanets (Chapter 21)
- Week 12 – Nov 5: - Stellar Evolution” (Chapter 22)
- Week 13 – Nov 10: - The Death of Stars (Chapter 23)
 - Black Holes (Chapter 24)
- Week 13 – Nov 12: - The Milky Way Galaxy (Chapter 25)
 - Galaxies (Chapter 26)
- Week 14 – Nov 17: - TEST 4**

MODULE 5

Week 14 – Nov 19: - Active Galaxies (Chapter 27)

Week 15 – Nov 24: - Galaxy Evolution” (Chapter 28)
- Galaxy Evolution” (Chapter 28 continued)
- Big Bang and Cosmology (Chapter 29)

Week 15 – Nov 26: - *Thanksgiving Holiday*

Week 16 – Dec 1: - Big Bang and Cosmology (Chapter 29 continued)
- Life in the Universe” (Chapter 30)

Week 16 – Dec 3: - TEST 5

- **End of course**