

# AST 301: INTRODUCTION TO ASTRONOMY

## Course Syllabus

Unique# 46145 Spring 2020

### Course and Contact Information

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<b>Lecture Hours:</b> M,W,F 2:00 PM - 3:00 PM	<b>Lecture Location:</b> PAI 3.02
<b>Office Phone:</b> 512-471-8312	<b>Office Location:</b> RLM 17.328 (17 <sup>th</sup> floor)
<b>Office Hours:</b> M. Endl: Friday 12:30-1:45 PM, location: RLM 17.328 (or per appointment) TA: TBA	
<b>Course Website:</b> CANVAS ( <a href="http://canvas.utexas.edu">http://canvas.utexas.edu</a> )	

### 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.

#### 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 primarily run through the Canvas system at *canvas.utexas.edu*. All class communication (lecture slides, homework assignments, etc.) will be done through Canvas.

**Required Texts/Materials**

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

**Grading System**

5 Tests	60%
Homework	20%
In-class activities	15%
Participation	5%

This class will not be graded on a curve. The average percentage in each of these grade components will be weighted 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.

## Course Policies:

### - Exam policies:

There will be 5 *written tests* throughout the semester. *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 in our classroom during nominal lecture hours. *All tests will be multiple-choice tests and we will use scantrons to grade them.* There are 5 sections to our course (see course calendar). The questions on each test will quiz you on the major concepts that we discussed in the section 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 and mini-quizzes. 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. *Again, there is no comprehensive final exam.*

Since everyone can have a “bad day”, or something unexpected happening, that prevents you from performing on your optimum level, I use a *weighting scheme* to compute the total test grade at the end of the semester. Your lowest test grade will be down-weighted by a factor of 2, and your best test grade will be given a higher weight by 50%, compared to the other tests. This weighting scheme works the following: your lowest test grade will account for up to 6 points only, the 3 intermediate tests will all count for up to 12 points each, and your highest test will count for up to 18 points. **The final test grade will constitute up to 60% of your total grade** ( $6+12*3+18=60$ ). So even if you miss a test, the worst that can happen is 6 points less for the total (which can be recovered by extra credit work). Make-up tests will only be given for students with a *valid excuse* (e.g. a documented illness by providing a doctor’s note and severe family emergencies).

- In-class activities: during lectures we will frequently perform small in-class activities (5-10 mins) to deepen your understanding of the material covered that day. Students should work together to answer the questions. You can use textbook, lecture slides and the internet to complete the activity. We will either use *insta-poll* on Canvas or paper worksheets 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 90% of all questions correctly you will get the whole 15 points.**
- Class Participation: Canvas offers a *discussion board* that allows students to talk about course-related astronomy topics. **For the participation score (so 5 points for the total) each student is required to start one discussion topic and moderate it.** 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.

- *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!). Just raise your 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, having read the textbook chapter or lecture slides, also please be prepared to participate in in-class discussions and activities, this is for your benefit.
- Do not pack up or leave class early unless you have talked to me in advance, as a consideration to me and your fellow students.
- To facilitate group-work, please sit together, and close to the front.
- Cell phones: please silence and pack away your cell phone. Students using their cell phone during class will be asked to leave the lecture hall. It is distracting to your fellow students and your instructor. *The sight of students looking at their cellphones in class is one of the most discouraging views an instructor can see during a semester.* Please be considerate.
- Laptops: the use of laptops to follow the lecture slides or to take notes is permitted. 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. If laptop distraction becomes a problem, I reserve the right to reverse this policy.
- I am a professional research astronomer, *which requires travel during the semester.* I will do my best to minimize the impact of this travel, and will maintain email and Canvas communication at all times while out of Austin. When I am gone, either 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.

### **- Homework Policies**

Each week you will receive one homework assignment. 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)! These are individual homeworks, therefore, if you copy or if someone copy from you, I will simply divide the grade. I encourage discussions between students, but not copies. 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.**

### **- Extra Credit**

There will be many extra credit opportunities over the course of the semester. Each test 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.

In addition to this, there is *one* extra credit assignment (worth 5 points of your total grade) for each student who participates in one of the observing sessions offered by the Astronomy Department. We have telescopes on top of Painter Hall and on the top floor of the Physics, Math, Astronomy building. Weather permitting, there are 3 star-parties per week. You will receive a signed confirmation from the folks running the telescopes. Hand in the confirmation to get the 5 extra credit points. For more information check out: <http://outreach.as.utexas.edu/public/parties.html>

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.

**- 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)

### **SECTION 1:**

Week 1 – Jan 22:	Introduction/Welcome/Syllabus
Week 1 – Jan 24:	Science and the Universe (chapter 1)
Week 2 – Jan 27:	Observing the Sky: The Birth of Astronomy (Chapter 2)
Week 2 – Jan 29:	Orbits and Gravity (Chapter 3)
Week 2 – Jan 31:	Earth, Moon and Sky (Chapter 4)
Week 3 – Feb 3:	Ch. 4 continued
Week 3 – Feb 5:	Radiation and Spectra (Chapter 5)
Week 3 – Feb 7:	Astronomical Instruments (Chapter 6)
<b>Week 4 – Feb 10:</b>	<b>TEST 1</b>

### **SECTION 2:**

Week 4 – Feb 12:	An Introduction to the Solar System (Chapter 7)
Week 4 – Feb 14:	Earth as a Planet (Chapter 8)
Week 5 – Feb 17:	Ch. 8 continued
Week 5 – Feb 19:	Cratered Worlds (Chapter 9)
Week 5 – Feb 21:	Venus & Mars (Chapter 10)
Week 6 – Feb 24:	Ch. 10 continued
Week 6 – Feb 26:	The Giant Planets (Chapter 11)
Week 6 – Feb 28:	Ch. 11 continued
Week 7 – Mar 2:	Rings, Moons, and Pluto (Chapter 12)
Week 7 – Mar 4:	Comets and Asteroids (Chapter 13)
<b>Week 7 – Mar 6:</b>	<b>TEST 2</b>

### **SECTION 3:**

Week 8 – Mar 9:	Origin of the Solar System (Chapter 14)
Week 8 – Mar 11:	The Sun (Chapter 15)
Week 8 – Mar 13:	The Sun II (Chapter 16)
Week 9 – Mar 16:	<i>Spring Break (no class)</i>
Week 9 – Mar 18:	<i>Spring Break (no class)</i>
Week 9 – Mar 20:	<i>Spring Break (no class)</i>
Week 10 – Mar 23:	Analyzing Starlight (Chapter 17)
Week 10 – Mar 25:	The Stars (Chapter 18)
Week 10 – Mar 27:	Celestial Distances (Chapter 19)
<b>Week 11 – Mar 30:</b>	<b>TEST 3</b>

**SECTION 4:**

- Week 11 – Apr 1: Gas and Dust in Space (Chapter 20)  
Week 11 – Apr 3: Star Formation and Exoplanets (Chapter 21)  
Week 12 – Apr 6: Ch. 21 cont.  
Week 12 – Apr 8: Stellar Evolution (Chapter 22)  
Week 12 – Apr 10: Ch. 22 cont.  
Week 13 – Apr 13: The Death of Stars (Chapter 23)  
Week 13 – Apr 15: Black Holes (Chapter 24)  
**Week 13 – Apr 17: TEST 4**
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**SECTION 5:**

- Week 14 – Apr 20: The Milky Way Galaxy (Chapter 25)  
Week 14 – Apr 22: Ch. 25 continued  
Week 14 – Apr 24: Galaxies (Chapter 26, 27)  
Week 15 – Apr 27: Ch. 26, 27 continued  
Week 15 – Apr 29: Evolution and Distribution of Galaxies (Chapter 28)  
Week 15 – May 1: The Big Bang & Cosmology (Chapter 29)  
Week 16 – May 4: Ch. 29 continued  
Week 16 – May 6: Life in the Universe (Chapter 30)  
**Week 16 – May 8: TEST 5 (last day of class)**
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