AST 307 - Introductory Astronomy

Spring 2016 - Unique No. 46870
TTh 9:30 — 10:45 @ PHR 2.108

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Course Description: This course provides an overview of modern astronomy and astrophysics for science and engineering majors. We cover topics from our place in the solar system, the formation and detection of planets, stellar evolution, galaxies across cosmic time, to the scale and history of the Universe from the Big Bang until the present day. We will also take a look at the historical context of some of the most important astronomical discoveries, from those of ancient Polynesian navigators to modern astrophysicists. Intermixed with lectures, our course will incorporate techniques from an inquiry-based approach to learning, including group activities, critical thinking exercises, and open ended analysis. The purpose of this approach is to introduce students to the methodology used by real scientists to solve real astrophysical problems.

Pre-requisites and Core Requirements: No formal pre-requisite is required for this course, although students should feel comfortable with algebra, geometry and pre-calculus concepts. This course is intended to be more mathematically rigorous than AST 301, a course which covers the same material but not at as great a depth.

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.

Required Texts and Materials:

- *The Cosmic Perspective*, 7th Edition. Bennett, Donahue, Schneider & Voit
- Access to *Mastering Astronomy*, often sold as a bundle with Cosmic Perspective
- Access to *Learning Catalytics*, which will be paired to your *Mastering Astronomy* account
- *Lecture-Tutorials for Introductory Astronomy*, 3rd Edition. Prather, Slater, Adams & Brissenden

You can purchase a *Mastering Astronomy* access code online by itself, online with an electronic copy of the textbook *Cosmic Perspective* bundled, or through the bookstore with a physical access code. The bookstore has told me that they have versions of the text in loose-leaf, that also include access to *Mastering* Astronomy. Note that if you purchase *Mastering Astronomy* access online by itself (not in a bundle), you will have to purchase access to *Learning Catalytics*. When registering your *Mastering Astronomy* access code choose "Cosmic Perspectives 7th ed" (careful of the correct edition) as the textbook. Do NOT choose the 6th or 5th editions. Our course ID is “CMCASEY46870” which you enter after you have registered.

You can access to *Learning Catalytics* using your *Mastering Astronomy* login information (your “Pearson” login) by going to the *Learning Catalytics* webpage, clicking “Register,” “I am a

student, ”I use a Mastering/MyLab Product.” We will be using *Learning Catalytics* everyday in class, which will require you to bring a wifi enabled device: a phone, tablet, or laptop.

Lecture-Tutorials for Introductory Astronomy will be used for in-class activities. Bring it to class every class period.

Class Structure: This class will not be a traditional University lecture course. It will combine short lectures with discussions and group activities. You will only learn if you participate in class activities, thus attendance and participation is *required*. Do not pack up or leave class early unless you have talked to me in advance, as a consideration to both me and your fellow students.

Class Website and email: The class website is hosted on canvas and should be checked regularly for updates and messages from me regarding exam review sessions, course materials, or special events. In addition to the class website, email is recognized as an official mode of university correspondence, so you are responsible for reading your email for university course-related information, and canvas-delivered announcements. Please check your email regularly and frequently and make sure you are set to receive notifications from Canvas as appropriate.

Use of electronics: The use of a wifi-enabled enabled device is a necessary part of this classroom, and will be an important component of your participation grade. However, students using their electronics/computers for non-class activities are a distraction to those around them. If we find your use of electronics a problem and a distraction to others, we will ask you to leave the classroom, not earning participation credit for that day.

Grading Components and Policies: You will receive the grade you earn in this course. There will be no extra credit awarded after the final class period of the semester, so please be sure to put in your best effort throughout the semester to earn the grade you would like. Your final grade will be composed of the following elements:

Performance on Exams = 60%
Online homework = 15%
In-class Participation = 15%
Science Writing Project = 10%

Here is more information on each of the grade components:

Exams: There will be four in-class, closed-notes, closed-book exams, each comprising 15% of your final grade, covering material discussed in class, as outlined in the class schedule. The dates for these four exams will be February 16, March 10, April 7, and May 3. You may replace one of your four in-class exam grades by taking the optional final exam which will cover all material in the course. The final exam will be held on Friday, May 13 from 2 - 5pm. There will be no opportunity for make-up exams, unless there is verified illness or emergency accompanied by a doctor’s note, a University related conflict (you are away from UT as part of a University-sponsored activity), or religious holiday. In the case that you are requesting to make up an exam for a University-related conflict or religious holiday, you must give me written notice of the conflict at least 14 days in advance of the scheduled exam date.

Homework: Online homework will be assigned weekly through "Mastering Astronomy" and due at the beginning of the day, at 8:00am, each Tuesday unless otherwise specified. The system will automatically cut off access to the homework at the designated due date (and time). No late credit will be given. On occasion, [paper] homework assignments or problem sets may be given in place of some online homework, in which case it must be turned in at the beginning of class on Tuesdays, unless otherwise stated in class or via canvas communication. Group work and discussion is allowed (and encouraged) for homework assignments, but each student must be responsible for their own understanding of the material from each assignment and independently complete the work.

Scientific Writing Project: In early March, you will be given a choice of essay prompts, a guideline/rubric for evaluation of that essay. The final essay will be due on the final day of class, May 5. The objective of this scientific writing project is to give you a realistic, everyday experience similar to those of professional astronomers. Contrary to popular belief, the vast majority of our time is spent writing (not staring at the sky!). Thus, articulating our scientific arguments clearly and succinctly is very important. If we don't write well and learn how to make clear arguments early on, it's far more difficult to be a productive scientist. The prompts will span topics from the evaluation of different astronomical endeavors to the intersection of astronomy and human culture.

This class will *not* be graded on a curve. Your grade is calculated to the nearest 1/100th of a percentage point. The average percentage in each of the above grade components will be weighted by the indicated percentage to derive the final course grade, to be assigned as follows:

93.00—100% = A	80.00 — 82.99% = B-	67.00 — 69.99% = D+
90.00 — 92.99% = A-	77.00 — 79.99% = C+	63.00 — 66.99% = D
87.00 — 89.99% = B+	73.00 — 76.99% = C	60.00 — 62.99% = D-
83.00 — 86.99% = B	70.00 — 72.99% = C-	0 — 59.99% = F

Accommodations for disabilities and/or family responsibilities: If you have any kind of disability, whether apparent or non-apparent, learning, emotional, physical, or cognitive, and you need some accommodations or alternatives to lectures, assignments, or exams, please feel free to contact me to discuss reasonable accommodations for your access needs. Students with disabilities may also request appropriate accommodations from the Division of Diversity and Community Engagement, and from UT's Services for Students with Disabilities. The official wording provided by the university is: The University of Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-6441 TTY or Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, www.utexas.edu/diversity/ddce/ssd.

Aside from disabilities, I recognize that students with children or family care responsibilities might require special accommodations on occasion, and they should contact me by email regarding missed or late work.

Regarding harassment/assault: Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights violations subject to the same kinds of accountability and the

same kinds of support applied to offenses against other protected categories such as race, national origin, etc. Harassment of any sort will not be tolerated in this classroom or related workspaces. If you or someone you know has been harassed or assaulted, you can find the appropriate resources through the University Title IX Coordinator (512-232-3992), UT Austin Campus Police (512-471-4441), the Student Ombuds Services (which can provide *confidential* advice, resources and help; 512-471-3825), and the UT Counseling and Mental Health Center (512-471-3515).

Cheating: If you get caught cheating in any way whatsoever, you will have to discuss the situation with me. I will arrive at a penalty and write up a formal report. The minimum penalty for cheating is receiving a 0 on the assignment on which you cheated. In this class, in addition to all the traditional types of cheating (looking at someone else's answer, utilizing "cheat sheets" of any form or fashion either paper or digitized, getting an advance copy of an exam or quiz), we also consider allowing someone else to use Learning Catalytics account cheating. For example, if you sign into multiple Learning Catalytics accounts during class, participating on behalf of another class mate or an individual who is not you and you are caught, you and your accomplice will be penalized by loosing 5 participation points (5% of your total grade) for the semester. If it happens a second time, all participation credit will be forfeited. If you deny a cheating allegation, I will proceed by filing a formal report to the Judicial Services in the Dean of Students Office as is policy. Judicial Services would decide the final penalty after a hearing on the matter. For more information, read in the General Information Catalog about scholastic dishonesty (i.e. cheating).

Drop date: The last day to drop the class is March 31, 2016. This will require you to go to your college and get a drop form. You then must bring the form to me and get my approval and signature. After this deadline, students must go to the Dean's office, WCH 2.112, to begin the appeal for substantiated non-academic reasons.

Class Material and Schedule: Below is the approximate course schedule and material we will cover on those days. The corresponding chapters and subsections in *Cosmic Perspectives* are noted for your convenience.

19 Jan	Introduction, Course Logistics, Fundamental Scales of the Universe	Chapter 1
21 Jan	Measuring the Earth and Moon	Chapter 1-2
26 Jan	Fundamentals of the Night Sky	Section 2.1, 2.3, S1.1
28 Jan	Seasons & Eclipses	Section 2.2, S1.2
2 Feb	The Solar System: an empirical look at discovery.	Section 2.4, 3.1-3.2
4 Feb	Physics in Astronomy, Kepler’s Laws	Section 3.3, Chapter 4
9 Feb	Kepler’s Laws cont, introduction to telescopes.	Chapter 4
11 Feb	Telescopes: Angular Resolution and Imaging	Chapter 6
16 Feb	**EXAM # 1 - Fundamentals of Astronomy**	
18 Feb	Spectra and Blackbodies	Section 5.4,

23 Feb	The Sun and properties of stars	Chapters 14, 15
25 Feb	What fuels stars? How are they born?	Section 14.2, Chapter 16
1 Mar	Life and death of stars	Chapter 17
3 Mar	Stellar remnants and recycling	Chapter 18
8 Mar	Overview of stellar lifecycle	Chapters 14-18
10 Mar	**EXAM # 2 - Stars**	
15-17 Mar	*Spring Break - No Classes*	
22 Mar	What are planetary systems?	Chapter 8
24 Mar	Searching for planets around other stars	Chapter 13
29 Mar	Star and Planet Formation Theories	Chapter 8
31 Mar	Planetary atmospheres & Geology	Chapters 9, 10
5 Apr	Aliens	Chapter 24
7 Apr	**EXAM # 3 - Planets**	
12 Apr	The Shapley/Curtis Debate & Measuring Intergalactic Distances	Chapter 20
14 Apr	Hubble Expansion & Dark Energy	Chapter 22, Section 23.4
19 Apr	Dark Matter and Galaxy Structure	Section 23.2, 23.3
21 Apr	Galaxies across Cosmic Time	Chapter 21
26 Apr	Quasars and Large Scale Structure	Section 21.3
28 Apr	Cosmology: birth and death of the Universe	Chapter 22
3 May	**EXAM # 4 - Galaxies and the Universe**	
5 May	Wrap up and discussion of projects; Final review.	
13 May	**OPTIONAL FINAL EXAM 2-5pm**	