AST 307: Introduction to Astronomy

Fall 2013 - Course # 48520

TTh 11:00 - 12:15 WEL 2.312

Professor: Dr. Adam Kraus

Office: RLM 15.310B

Phone: TBD

E-mail: alk@astro.as.utexas.edu

Office Hours: Tues 1-2, Wed 1-2

Teaching Assistant: Jeremy Ritter

Office: RLM 16.212

Phone: (512) 471-8443

E-mail: jritter@astro.as.utexas.edu

Office Hours: Mon 3-4, Wed 4-5

Course Logistics

Text: The Cosmic Perspective, 7th Ed., Bennett, Donahue, Schneider & Voit. Note that 5th ed or later is fine for the purposes of this class. The textbook is designed for non-science majors. This class is more mathematically oriented than the textbook; additional material will be provided in the lecture or in links to online resources.

Web page: See Blackboard for announcements, documents, readings, and assignments.

Prerequisite: Math 305G or equivalent. The course will use algebra, logarithms, and trigonometry. Knowledge of calculus might deepen understanding of some concepts, but will not be required for any homework or exams. Plan for significant use of concepts from high school physics.

Course Description & Philosophy

This course will provide an overview of astronomy, including basic physical concepts, planets, stars, galaxies, and cosmology. The course is designed to emphasize conceptual understanding and an appreciation for the discovery process, rather than memorization of facts. The students will learn how scientific discoveries were made, and in the process we hope they will develop an appreciation for the universe around us.

The students should feel free to look up any numbers or equations that they need in order to solve a problem on the homework. In exams, relevant numbers and equations will be given; it is the responsibility of the student to know how to use them. As a result of this philosophy, there will be a heavy emphasis on showing your work. The correct answer, if not justified by the appropriate mathematical work, will receive no credit. The physics and mathematics we use will be taught/reviewed as we go along, rather than subjecting you to an unnecessarily unpleasant "boot camp" at the start of the semester.

We assume that most members of this class will go onward to study some field of science, mathematics, or engineering, so this class should be regarded as practice in how to think like a scientist. Personally, I will consider this class a success if you develop the habit of asking one question: **Does this answer make sense?** Astronomy deals with some very large numbers, rapidly outgrowing a person's intuitive sense of scale. We want to build a new sense of intuition that encompasses large numbers, and the ability to ask if an answer is even on the right order of magnitude. Think logarithmically, not linearly!

Class Structure

Rather than a typical college survey course composed solely of lecturing, this course will combine short lectures with discussions and group activities. Attendance and participation are mandatory, and will be required to fully benefit from the class and to understand the material that will be tested in the exams.

Each class will consist of two lectures for ∼30 minutes, divided by a brief intermission for an interactive activity to determine class participation. These activities will include quizzes over the reading and think-pair-share activities; the choice of activity will vary from day to day.

Grading

Course grades will use the plus/minus system, along with the standard cutoffs. There will be no rounding. The composition of the course grade is:

- Three In-Class Exams = 3 x 20% = 60%.

- Optional Comprehensive Final Exam, which can replace the lowest regular exam (but will not lower your grade). **The final exam can not replace a zero due to an unexcused absence!**

- Weekly Homework = 30%

- In-Class Participation = 10%

Astronomy, as with all STEM classes, is fundamentally a cumulative topic. Once a topic is discussed, you shouldn't be surprised if it shows up again - yes, even if we've already had an exam on it! The course is structured to start small (planets) and go larger (ultimately discussing the Universe as a whole). At each stage, the smaller objects act as the building blocks for the larger objects we discuss.

The exams will be given on Sep. 26, Oct. 31, and Nov. 26. Makeup exams for verified illnesses will be scheduled as needed, but I need to be notified beforehand, and will expect to see a doctor's note afterward stating you were physically unable to attend. The scheduled period for the optional final exam is Dec. 11 at 9:00-12:00 noon. The students will be notified via email of their grade by Monday, Dec. 9. They can then choose whether to attend the final exam or not. All exams will be closed-book and closed-notes; the instructor reserves the right to give you any equations that are deemed too complicated to be worth remembering, as well as any physical constants.

Homework will be assigned on Thursday of each week, and will be due at the beginning of class on the following week. Late homework can be turned in up until an assignment is returned to the class, but the final score will be halved. **No homework will be accepted more than one week after the deadline!** Each homework will consist of a combination of multiple-choice or ranking problems, activities requiring data acquisition by the students, and short-answer problems requiring math to derive an answer. **SHOW YOUR WORK.** The correct answer will earn no points if we can't see how you derived that answer. Conversely, if you follow all the correct steps

and get the wrong answer due to an arithmetic error, we don't really care and will award most or all of the points. If you want partial credit, then help us to help you, and show what you did.

Class participation will be measured via an activity scheduled in the middle of each class; you will be expected to turn in either individual work (if a quiz) or group work (if a group activity). These will only be assessed for a good-faith effort at answering the question; all such efforts will receive credit. I care that you think, not that you necessarily get the right answer. However, I will probably be calling on some of you to share your thoughts on each activity, so it behooves you to try getting the right answer anyway!

Finally, the students can make up for absences by attending a public viewing event organized by the astronomy department. This will add up to 2% to their class participation grade (albeit not passing the 10% maximum). The website for these events is at http://outreach.as.utexas.edu/public/viewing.html. To receive credit, the students should obtain a slip from the organizer stating that they attended, and should turn in a one-page writeup where they discuss something interesting about one or more objects they observed.

Approximate Course Schedule

1. Aug 29: Introduction and bureaucracy. The Earth, the Moon, and the Sun.

2. Sep 3-5: The Rest of the Solar System: Discovery, structure and motion.

3. Sep 10-12. A tour of the solar system: Planets, Moons, and Cosmic Debris. **Note: Sep 13 is the last day to add or drop!**

4. Sep 17-19. Understanding the Sun.

5. Sep 24-26. Wrap up, review, and **exam**.

6. Oct 1-3. The properties of other stars.

7. Oct 8-10. The formation of other solar systems.

8. Oct 15-17. The deaths of stars.

9. Oct 22-24: Planets around other stars.

10. Oct 29-31: Wrap up, review, and **exam**.

11. Nov 5-7: The Milky Way and its galactic brethren.

12. Nov 12-14: The structure of the universe, and how galaxies form and evolve.

13. Nov 19-21: Cosmology, dark matter, and dark energy. The Big Bang, and the fate of the universe.

14. Nov 26: **Exam.**

15. Dec 3-5: The frontiers of astronomy: Where are we going?

16. Dec 11: Optional final exam, 9:00-12:00 noon.

The instructor reserves the right to change the course schedule or the content on exams as needed.

Class Policies

- The course webpage and/or Blackboard will be updated with announcements, reading assignments, and deadlines. It is your responsibility to check these on a regular basis. Please come to class prepared, having read the required reading assignments, as the quizzes and in-class activities (which determine your class participation grade!) will be based on the reading. Please also be prepared to participate in in-class discussions and activities.

- 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.

- Phones: Phone use and texting during class will not be tolerated. Make sure your phones are off, and keep them put away during class. Students using their phones will be asked to leave, and will not earn participation points for that day.

- Laptops/tablets: Though laptop and/or tablet use will not be a necessary part of the class, I acknowledge that some students prefer to take notes electronically, and therefore their presence will be permitted. Students using their computers for non-class activities are a distraction to those around them, and will be asked to leave, and will not earn participation points for that day. I tend to wander around the room while talking, and I know what Facebook looks like - don't assume you can blend into the crowd! If laptop distraction becomes a problem, I reserve the right to reverse this policy.

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 penalities, including the possiblity of failure in the course and/or dismissal from the University. Standards for Academic Integrity are posted at http://deanofstudents.utexas.edu/sjs/acint_student.php.

In other words, you should turn in work that is your own.

Documented Disabilities

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 Servies for Students with Disabilities at 471-6259 (voice) or 232-2937 (video phone) or http://www.utexas.edu/diversity/ddce/s

Email

Email is recognized as an official mode of university correspondence, so you are responsible for reading your email for university and course-related information and announcements. Please check your email regularly and frequently.