

Astronomy 1400 Section 001 CRN 10002
Solar System, Fall 2013

Instructor:

Office:

Office Hours:

Contact Information: e-mail:

Office Phone:

Textbooks: **The Solar System, The Cosmic Perspective**, Sixth Edition, by Bennett, Donahue, Schneider, and Voit. Published by Addison Wesley. It should come with **Starry Night** software. If you have a used book or bought a book that did not come with the software you can download it from the following web site for about \$25 (using the 4 digit student code 481a) <http://www.starrynighteducation.com/store/index.php/starrynightcollege-student.html> Also for the lab: **Astronomy 1400: Solar System Astronomy Lab Manual** by the Department of Physics, Texas Tech University

Lecture: TR 8:00 am to 9:20 am in Sc 007

Laboratory:

There is a **required** laboratory that is part of this course. You will receive one grade for the lecture and laboratory combined—they are not separate courses. In **addition** to the weekly lab meetings in the Science Building (room Sc121), you have the opportunity to visit the Texas Tech Observatory for some nighttime observations and the Texas Tech Moody Planetarium as part of your lab grade. All necessary information regarding these activities will be posted on the observatory web site (the observatory information link on the Texas Tech physics home page) or in your lab manual. The laboratory meets in SC 121 beginning the week of September 10th. If no lab is listed on your schedule, see the course instructor immediately. The “Discussion” listed on your schedule is the off-campus part of the lab.

Course Purpose:

ASTR 1400 satisfies half of the 6 hour life and physical sciences core curriculum requirement at Texas Tech University. The laboratory section of the course also satisfies the university graduation requirement that all students complete 2 hours of science laboratory

The objective of the study of the life and physical sciences component of a core curriculum is to enable the student to understand, construct, and evaluate relationships in the natural sciences, and to enable the student to understand the bases for building and testing theories. The natural sciences investigate the phenomena of the physical world.

Students graduating from Texas Tech University should be able to: explain some of the major concepts in the Natural Sciences and to demonstrate an understanding of scientific approaches to problem solving, including ethics.

ASTR 1400 has no pre-requisites. It serves well the student that is interested in astronomy and the student who is not science oriented but needs to satisfy the science requirement. The course is very important for both groups of students. For those interested (or who inadvertently become interested), this course will give you the tools to continue astronomy as a lifelong interest. For those not really interested, it is still very important for you to have a basic understanding of science if you are to take your place as an educated member of society because the population at large determines the role of science in society—not just the scientists. This course is an excellent venue for achieving a basic understanding of science.

Course Description:

We begin by acquainting ourselves with some basic ideas and observations of modern astronomy. Once the modern view is expounded, we back up and historically account for how this view came about. Next the basic principles of physics that allow astronomers to learn things about the universe are covered. At this time we also examine how telescopes work, and how astronomers use satellites and space probes. Once we are done with these preliminaries, we move on to the solar system covering topics such as how and when does a solar system form. Then we take a close look at our own solar system through comparative planetology. Here we consider the geologies and atmospheres of the terrestrial worlds and the physics of the Jovians. We also account for asteroids and comets. Lastly we look at solar systems about other stars than our Sun to put our own solar system into perspective. In addition to the topics above, we will also be keeping abreast of current space missions and any exciting celestial events that might come our way.

Expected Learning Outcomes:

Upon completion of this course, students will:

1. Understand the motions of celestial objects (Sun, Moon, Stars, Comets, Planets, and Asteroids) in the sky
2. Understand astronomy basics (For example: What is the ecliptic? Celestial equator? Equinox? Solstice? When do eclipses occur? ...)
3. Know the history of astronomy.
4. Understand the physics of astronomy at an elementary level and know how astronomers use it to learn about the universe.
5. Understand how telescopes work.
6. Understand the physical principles involved in the formation and maintaining of planetary atmospheres.
7. Understand the physical principles involved in the geology of the terrestrial worlds.
8. Understand why the Jovians formed as they did
9. Understand how a solar system forms
10. Study the nature and detection of extrasolar planets
11. Have the tools needed to continuing enjoying astronomy on their own as a hobby if desired. By enjoying I mean that the motivated student will be able to use a simple telescope to make observations of and identify celestial objects.

Methods for Assessing the Expected Learning Outcomes:

Exams, Class Discussions, Classroom Assessment Techniques, and Polling the class.

Determining your course grade:

- There are 50 possible points for the laboratory part of your grade. They are distributed as follows: 9 labs in Sc 121 at your scheduled lab time that are worth 3 or 4 points each depending on the difficulty of the lab, three outdoor nighttime observing labs that are worth 4 points each, one lab at Texas Tech Moody planetarium that is worth 4 points, and one take home lab that is worth 4 points. **You must attend the lab to get credit for it.**
- There are 60 possible points for the lecture part of your grade. In the lecture there will be three tests. Of these three test grades, the two highest will each be worth 20 points. **There will be no make-up for missed tests after one day from the time the test is given.** If possible please let me know early if you are going to miss a test since there is a possibility that you may take the test in advance. Also there will be a final exam that is worth 20 points. The final exam is required and cannot be dropped. The questions on the three tests and final will be taken from material covered in class, from assigned reading in the text, and from assigned work outside of class.
- To calculate how many points that you earn for each task, multiply the grade you got for that task divided by 100 times the number of points that the task is worth. For instance, if your grade on test 1 was a 95, you earned 0.95 times 20 which is 19 points for that test.
- Your final course grade is the sum of the points earned in lab and in the lecture. Notice that if you add the points possible in the lab to those possible in the lecture, the sum is 110 points. 100 points is a perfect score in Astronomy 1400. Thus the extra 10 points serves as a cushion in case you are unable to attend a lab **for any reason** or if one of your labs is cancelled due to reasons beyond our control such as **weather**. There are no make up labs for the labs scheduled in Sc 121, however if you miss your lab try to attend the missed lab in a different section for up to two missed labs. **You must arrange this with your teaching assistant for your lab first.** In the case of the outdoor observing labs, if a lab is cancelled due to weather or road conditions, we will do our best to reschedule a make-up lab. However at times we cannot schedule a make-up lab or you may not be able to attend the make-up at the time it is scheduled. The 10 extra points serves as a cushion for this reason as well. If you are able to attend all labs and have no rainouts, any of the cushion 10 points you earn are extra credit in your course grade.

Tentative Test Dates for the lecture: September 25th, October 25th, November 27th

Final exam date: December 12th at 7:30 am (place to be announced in class).

Grading Scale based on point earned:

Above 100 points= A+, 90-100= A; 80-89.9=B; 70-79.9=C, 60-69.9=D, Below 60=F

Attendance to the lecture portion of Astronomy 1400:

Attendance will be taken but will not affect your grade in the lecture portion of the class. A spirit of honesty will be maintained in the attendance policy: if the number of people in the class does not equal the number of people checked off on the attendance sheet, no curve will be issued if the class as a whole performs poorly on a test. Note you are responsible for everything that we do in class, so it is to your advantage to attend. (For the lab portion of your grade, attending the lab is the only way to get credit.)

A Class Policy for Astronomy 1400: *Earth Creatures Beware...*

- Reading newspapers or unrelated material, texting or talking on your cell, visiting with your neighbor, and irrelevant activities are not allowed in this class because it distracts your teacher and the other students. Do these things and you will be asked to leave the class.
- **NO LAPTOPS** or any other electronic devices are allowed in class unless need for such device for reason of a disability is documented by AccesTECH.
- If you have an emergency situation that requires you to take a cell phone call or text during class leave the room to take the call or text and return when you are finished.

NASA: check out all past current and future missions by the USA in space:

<http://www.jpl.nasa.gov/>

NASA picture of the day: <http://antwrp.gsfc.nasa.gov/apod/>

Download a free sidereal clock (for pc): <http://www.radiosky.com/sidclockdownload.html>

Tentative Course Outline for the Lecture

Date: week of	Topics to be covered*	Important Dates
Aug 27th	Course Syllabus, Chapter 1	
Sept 3rd	Chapter 1 and 2	Register for Outdoor Labs
Sept 10th	Chapter 2 and 3	Lab begins in Sc 121
Sept 17th	Chapter 3	
Sept 24th	Chapter S1	Test 1 Sept 25th
Oct 1st	Chapter 4	
Oct 8th	Chapter 5	
Oct 15th	Chapter 6	Planetarium Lab
Oct 22nd	Chapter 7	Test 2 Oct 25th
Oct 29th	Chapter 8	
Nov 5th	Chapter 9	Take Home Lab Due in Lab
Nov 12th	Chapter 10	
Nov 19th	Chapter 11	No Labs meet this week
Nov 26th	Chapter 12	Test 3 Nov 27th
Dec 3rd	Chapter 13	
Final		Dec 12th 7:30 am

Added to the topics in the text will be current mission news from NASA, current events in the night sky such as possible meteor showers, eclipses, and interesting oppositions, and current locations of the Moon, planets and other objects of interest. Other topics may be included as the need arises. Test material will cover the Text assignments listed above as well as the additional material covered in class.

Astronomy 1400 Lab Schedule

Week	Topic and Experiment	
1	Basic Notions: Introduction to Astronomy 1400	(3 points)
2	Sunspot Lab (3 points)	
3	Hunting for Asteroids (CLEA) (3 points)	
4	Retrograde Motion of Mars (3 points)	
5	Revolutions of the Moons of Jupiter (CLEA) (3 points)	
6	Planetarium Lab (4 points)	
7	Radar measurement of the Rotation Rate of Mercury (CLEA) (4 points)	
8	Studying the Moon's Surface (4 points)	
9	Ices and Water on Mars (4 points)	
10	Detection of Extrasolar Planets. (3 points)	

Natural Science Core Statement

This course satisfies the Life and Physical Science Core Education requirement. To meet this requirement the scientific method will be discussed and the construction of a scientific hypothesis will be explicitly discussed and tested. The scientific method will be the subject of several lecture portions throughout the semester.

Students graduating from Texas Tech University should be able to: explain some of the major concepts in the Natural Sciences and to demonstrate an understanding of scientific approaches to problem solving, including ethics. Moved up to p. 1.

Coordinating Board Objectives	Assessment Measures
Critical Thinking Skills: Students will gain critical thinking skills by evaluating descriptions of physical situations, assessing the relevant parts and representing them graphically, then mathematically, then solving for quantities, and, finally, considering the result to ascertain whether it is a reasonable result. In the lab students learn to relate a physical situation with meaning as they perform measurements and calculations.	In-class exams, class discussion, lab discussion, lab group interactions.
Communication Skills: Students develop oral communication skills through in-class and small group discussions around physical situations and how to interpret them for analysis. The outcomes of these discussions are visual representations of the essentials of the particular physical situation. Written communication skills are developed as the student analyzes problems and writes solutions for discussion in recitation. In the lab students orally communicate as a group coming to a consensus on how to execute the experiment, they collect data as a group, analyzing the results and representing the results graphically and visually and defending individual's interpretations.	Class discussion, lab group interaction. Written and visual communication are addressed in the description to the left. Why are there no assessments here?
Empirical and Quantitative Skills: Students learn to categorize physical situations into few types represented by a few free body diagrams. Then, based on the appropriate diagram they construct equations that pertain to the situation and solve them for relevant quantities.	In-class exams, class discussion, lab discussion, lab group interactions.
Teamwork: In lab students will work as groups to design an experiment, execute it, collect the results, assign meaning to the results, and graphically represent the results. In recitation students will work as a group to analyze problems, decide on strategies to address the problem, and attempt to solve it.	Class discussion, lab group interaction.
TTU Student Learning Objectives	
Knowledge of the Scientific Method: The student uses the scientific method in analyzing physical problems and then extracting quantities of interest. The student	Class discussion, lab group interaction.

will discuss other methods of deconstructing physical problems and will discuss the ways in which those tactics are insufficient.	
Knowledge of Tools and Methods of Scientific Inquiry: Students measure and graphically represent a wide range of data, then interpret their measurements to compare with what more formal measurement has found.	Class discussion, lab group interaction.
Explain some of the Major Theories in Natural Science: Students acquire an understanding of position, velocity, acceleration, force, and gravity.	In-class exams, class discussion, lab group interaction.
Describe how research informs social issues, including ethics: The successful student will be able to relate the study of motion to considerations like satellite orbits, space flight, solar power, and wind energy. Ethical ramifications are drawn out.	Class discussion, lab group interaction.
College Level Competency Objective	
Major Concepts: Students graduating from Texas Tech University should be able to: explain some of the major concepts in the Natural Sciences and to demonstrate an understanding of scientific approaches to problem solving, including ethics. Students completing ASTR 1400 will have a good understanding of the use of the scientific method, planetary motion, and how these facts interact with societal beliefs from antiquity to today.	Class discussion, lab group interaction.

Important Notes:

ADA: Any student who, because of a disabling condition, may require special arrangements in order to meet the course requirements should contact the instructor as soon as possible to make any necessary arrangements. Students should present appropriate verification from Student Disability Services during the instructor's office hours. Please note instructors are not allowed to provide classroom accommodations to a student until appropriate verification from Student Disability Services has been provided. For additional information, you may contact the Student Disability Services office at 335 West Hall or 806-742-2405.

Religious Holidays: A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence.

Academic Integrity: It is the aim of the faculty of Texas Tech University to foster a spirit of complete honesty and high standard of integrity. The attempt of students to present as their own any work not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offenders liable to serious consequences, possibly suspension. For details, see TTU OP 39.12