

Classical and Modern Astronomy
AST 105 Section _____
Department of Physics and Astronomy

Name:

Office:

Email:

Office Hours:

Phone:

Class meeting time and place:

Course Description

Introductory study of planetary astronomy, astrophysics, and cosmology. Computation of lecture and laboratory grades into one grade; same grade recorded for both lecture and laboratory. Corequisite: AST 105L.

This is a survey course that will stress the historical and descriptive aspects of our knowledge of astronomy. Astronomy has moved beyond the observational science it was 150 years ago. Using the advances in physics, we can now explain and predict natural phenomena. Whether studying the Sun for insight into Earth's climate, asteroid impacts to gauge human long-term survivability, or the search for extra-terrestrial intelligence, astronomy touches on a wide range of human experiences. The major aim will be to give each student an appreciation and understanding of the size, scale, and structure of the cosmos, to gain an understanding of the nature of science and astronomy, to see that the universe is comprehensible through the scientific principles that can be understood by everyone, and to gain an increased interest in studying current events in astronomy as a life-long learning activity. The methods of science will be strongly emphasized.

Program Learning Outcomes

This is a general education core curriculum course and no specific program learning outcomes for this major are addressed in this course.

General Education Core Curriculum Objectives/Outcomes

- CO1 - Critical Thinking Skills** - including creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
- CO2 - Communication Skills** - including effective development, interpretation and expression of ideas through written, oral and visual communication
- CO3 - Empirical and Quantitative Skills** - including the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
- CO4 - Teamwork** - including the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

Student Learning Outcomes

The overall objectives of this course are that the learner will:

- SLO1** - Recognize that the universe can be described by a few natural laws. This objective links directly to CO1.
- SLO2** - Describe the characteristics of objects within the solar system including the sun, planets, moons, asteroids, and comets. This objective links to CO2, CO3, and CO4 in the laboratory experiments and exams of the lecture portion of the course
- SLO3** - Demonstrate a basic familiarity with stellar life cycles, galaxies, and extragalactic objects. This objective links to CO2, CO3, and CO4 in the laboratory experiments and exams of the lecture portion of the course.
- SLO4** - Demonstrate skills developed in critical thinking, communication (written and visual), empirical and quantitative analysis, and teamwork, (SLO 4. Includes COs 1, 2, 3, 4)

Text and Materials

The text is *The Essential Cosmic Perspective*, sixth edition by Jeffrey Bennett, Megan Donahue, Nicholas Schneider, and Mark Voit. The order of the course as well as the timing of the exams is indicated in the Course Calendar below. AST 105L, the Astronomy Laboratory is a co-requisite and a new edition of the lab manual is available in local bookstores only.

Course Calendar

Each exam section of the course is 25% of class time. Introduction of the core objectives will be by readings and YouTube video segments (See the Course Calendar for times). Power point slides will also help to introduce the objectives during labs 2 and 3, where the objectives are assessed. SLO 1 is a major aim of the course and is addressed throughout.

Lecture Calendar

Week	Title	Topics	SLO	Text Chapter
1	Our Place in the Universe Lecture and assigned readings on CO 1	Scale of the Universe		1
1	Discovering the Universe for Yourself Lecture and assigned readings on CO 2	Sky Motions		2
2, 3	The Science of Astronomy Lecture and assigned readings on CO 3 Lecture and assigned readings on CO 4	Greek and Renaissance Astronomy		3
4	Making Sense of the Universe: Understanding Motion, Energy, and Gravity	Newton's Laws and Gravity		4
4	Exam 1			Date 1
5, 6	Light: The Cosmic Messenger	Properties of Light		5
7, 8	Surveying the Stars	Properties of Stars		11
8	Exam 2			Date 2
9, 10	Our Star	The Sun	SLO 3	10
10, 11	Star Stuff	Stellar Evolution	SLO 3	12
11	The Bizarre Stellar Graveyard	Stellar End Points	SLO 3	13
12	Our Galaxy	The Milky Way	SLO 3	14
12	Galaxies and the Foundation of Modern Cosmology	The Universe of Galaxies	SLO 3	15
12	Dark Matter, Dark Energy, and the Fate of the Universe	Dark Matter and Energy and the End of Time	SLO 3	16
12	The Beginning of Time	The Big Bang	SLO 3	17
12	Exam 3			Date 3
13	Formation of Planetary Systems: Our Solar System and Beyond	General Solar System Properties	SLO 2	6
13, 14	Earth and the Terrestrial Worlds	Terrestrial Planets	SLO 2	7
14	Jovian Planet Systems	Jovian Planets	SLO 2	8
15	Asteroids, Comets, and Dwarf Planets: Their Nature, Orbits, and Impacts	The Rest of the Solar System	SLO 2	9
15	Life in the Universe	SETI	SLO 2	18
15	Exam 4			Date 4

Lab Calendar

Lab	Title	SLO	Core Objective
1	Constellations		
2	Lunar Phases*	SLO 2	CO 1, 2, 4
3	Measurements**		CO 3
4	Mercury's Orbit	SLO 2	
5	Emission Spectra		
6	Earth's Orbital Velocity	SLO 2	
7	H-R Diagram	SLO 3	
8	Stellar Parallax	SLO 3	
9	The Pleiades		
10	Clusters	SLO 3	
11	Hubble's Law	SLO 3	
12	Rotation of Saturn	SLO 2	
	Lab Exam		

* The **Lunar Phases Experiment** (Lab 2) will allow students to demonstrate their mastery of skills in **critical thinking, communications and teamwork**. Students commonly work in teams of 4-5 in the laboratory (CO 4) and monitoring by the instructor ensures that the teams work together. Students will have read the assigned readings and have watched a YouTube video segment on **teaming, communications, and critical thinking** before the lab. The introductory Power Point presentation will include slides on the elements of **critical thinking, communications, and teaming**. The laboratory exercise follows on a study that addresses the question, "What Causes the Phases of the Moon." <http://www.youtube.com/watch?v=RY8izdr4cU4>). The teams will collect and analyze data, draw conclusions based on differing viewpoints and communicate (CO 2) findings in a written report. Questions for this lab will bring the students through the steps in critical thinking required to successfully predict lunar phases (CO 1).

The **Measurements Lab (Lab 3) will allow students to demonstrate their mastery of their **empirical and quantitative skills**. This lab is an introduction to scientific notation, significant figures, unit conversion, and errors of measurement. Students will have read the assigned readings and have watched a YouTube video segment on **empirical and quantitative skills** before the lab. The introductory Power Point presentation will include slides on the elements of **empirical and quantitative skills**. In the exercise examples are provided to test unit conversion skills and a sample calculation of the mass of the Sun is built in. (CO 3)

In addition to the lab schedule, we require each student to attend one night exercise at the SFA Observatory.

Course Requirements

Exams

There will be four major tests each covering a limited amount of material. The lab exam is scheduled separately from the fourth exam. Twenty-five (25%) percent of the lab portion of the course comes from the lab exam.

Homework

The course calendar lists the titles of the textbook chapters so that the students know how the course proceeds and when readings will be discussed. The table below gives typical Masteringastronomy assignments. (Note: different sections of this course will make different assignments from Masteringastronomy, but we all use the Masteringastronomy website.) The links to the core objectives does not imply assessment.

Mastering Astronomy Assignments (Typical)

Section	Assignment/Core Objective
1	Chapter 2: Seasons – CO1
	Chapter 2: Lunar Phases – CO1
	Kepler's Laws – CO1&3
2	Properties of Light - CO1&3
	Doppler Effect – CO1
	Chapter 11 Conceptual Quiz – CO1
3	The Sun – CO1
	Chapter 13 Conceptual Quiz – CO1
	Distance Scale – CO3
4	Chapter 7 Conceptual Quiz – CO1
	Planet Formation – CO1
	Chapter 8 Conceptual Quiz – CO1

Grading Policy

Each major exam will be graded on a 100-point scale. No grade curving is done on any grade in this course. In addition to exams, homework, class attendance, and participation (including class discussion and attendance) factor into the lecture grade (see table below). The lecture (75%) and lab (25%) grades will be combined into the course grade and the same grade will be recorded for both lecture and lab.

Exams	Homework	Participation	Lab
55	10	10	25

Slight differences in these weights between sections may exist.

The grading scale is...

A 90 – 100 B 80 – 89 C 70 – 79 D 60 – 69 F < 60

Attendance Policy

Each section designs its own attendance policy, but typically after two-weeks of unexcused absences, students are lowered by one letter grade. Any more unexcused absences result in a failing grade.

Academic Integrity (A-9.1)

Abiding by university policy on academic integrity is a responsibility of all university faculty and students. Faculty members must promote the components of academic integrity in their instruction, and course syllabi are required to provide information about penalties for cheating and plagiarism as well as the appeal process. (Much of this information will be provided through internet links.)

Definition of Academic Dishonesty

Academic dishonesty includes both cheating and plagiarism. Cheating includes, but is not limited to: (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) falsification or invention of any information, including citations, on an assignment; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism include, but are not limited to: (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from the Internet or another source; and (3) incorporating the words or ideas of an author into one's paper or presentation without giving the author due credit.

Please read the complete policy and the appeals process at

http://www.sfasu.edu/policies/academic_integrity.asp and

http://www.sfasu.edu/policies/academic_appeals_students.asp

Withheld Grades Semester Grades Policy (A-54)

At the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future semesters, the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

Students with Disabilities

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. This syllabus and other course materials can be made available in other formats. This course meets certain objectives of the ExCET/TEKS. A copy of the objectives and course correlations is available in the ExCET Advisor's office.

F-1 Visa Holders

There are important federal regulations pertaining to distance education activity for F-1 Visa holders. All students with an F-1 Visa should follow the instructions at the following link to make sure they are in compliance.

<http://www.oit.sfasu.edu/disted/facsup/f1visa.html>