

Revised by: D. Reynolds Reviewed by: M. Mayfield Reviewed by: J. May Text update: Fall 2025 C & G Ed approval: November 11, 2020 Board approval: January 13, 2021 Semester effective: Fall 2025

Astronomy (ASTR) 1511 Introduction to Astronomy with Lab (4 Units) CSU: UC

Advisory: English 1000, Reading 1005, and Math 1050 strongly recommended.

Prerequisite: None

Hours and Unit Calculations: 48 hours lecture. 96 Outside of Class Hours; 48 hours lab (192 Total Student Learning Hours) 4 Units

Catalog Description: This survey course includes historical development of astronomy; astronomical instruments; basic physical laws and processes; the formation, life cycle and death of stars; the structure and dynamics of the Milky Way galaxy and other galaxies, and the structure of the universe; cosmology; and the evolution and structure of the solar system.

Type of Class/Course: Degree Credit

Text: Bennett, Jeffrey, et al. *The Cosmic Perspective*. 10th ed., Pearson, 2023.

Additional Required Materials:

Bennett, Jeffrey, et al. *Mastering Astronomy with eText - Access Code - for The Cosmic Perspective*. 10th ed. Pearson. 2023.

Reynolds, David. Astronomy 1511 Laboratory Manual. Taft College Print Shop, 2020

Course Objectives:

By the end of the course, a successful student should be able to

- 1. provide a descriptive overview of the contents of the universe, with secondary emphasis on the solar system, and identify the type of astronomical object shown in selected images,
- 2. demonstrate a qualitative understanding of the processes occurring in stars, galaxies, interstellar matter and the solar system, and of the basic physical laws that govern these processes,
- 3. develop the ability for logical scientific thought to the point of applying the physical and geometric principles discussed to the analysis and qualitative solution of simply stated astronomical problems. As far as possible, considering the level of the course, this objective will be emphasized relative to the memorization of facts, and
- 4. develop an understanding of scientific inquiry and the scientific method through examples drawn from the history of astronomy and develop an appreciation of the crucial role of astronomy in the development of modern science.

Course Level Student Learning Outcomes:

1. Employ evidence-based reasoning when analyzing information in the completion of non-



computational physical science problems.

Local General Education Learning Outcomes:

- 1. Develop an understanding of the relationship between science and other human behaviors.
- 2. Demonstrate the scientific method.

Course Scope and Content (Lecture):

Unit I	Grand Tour of the Heavens		
	A.	Astronomers tools	
	B.	Constellations	
	C.	Stellar measurements	
	D.	Origins	
	E.	Science versus pseudoscience	
Unit II	Electromagnetic Radiation		
	A.	Electromagnetic radiation	
	B.	Black body radiation	
	C.	Absorption and emission spectra	
	D.	Properties of matter	
	E.	Doppler effect	
Unit III	Optics and Telescopes		
	A.	Eyes and cameras	
	B.	Refracting telescopes	
	C.	Reflecting telescopes	
	D.	Schmidt telescope	
	E.	Ground based telescopes and satellites	
Unit IV	Motion	of Stars and Planets	
	A.	Phases of the moon	
	B.	Solar and lunar eclipses	
	C.	Apparent magnitude	
	D.	Celestial sphere	
	Е.	Celestial coordinates	
	F.	Seasons, time zones and calendars	
Unit V	History of Astronomy		
	A.	Ancient roots of science	
	B.	Aristotle	
	C.	Ptolemy	
	D.	Copernicus	
	E.	Brahe	
	F.	Kepler	
	G.	Galileo	
	H.	Newton	
Unit VI	The Solar System		
	A.	Terrestrial planets	
	B.	Jovian planets	
	C.	Pluto and Charon	

D. Asteroids



	E	Comets	
	F.	Other solar systems	
	G.	Formation of our solar system	
	U .	romation of our solar system	
Unit VII	Our Sun		
	Δ	The Sun's basic structure	
	R.	Hydrogen fusion and neutrinos	
	D. C	Supervise and other solar activity	
	C.	Sunspots and other solar activity	
Unit VIII	Distant Stars		
	A	Color, temperature and spectra of the stars	
	B	Stellar classification	
	D. C	Stellar parallay	
	С. D	The inverse square law	
	D. E	Hertzerrung Dussell diegrone	
	Е. Г	Renzsprung-Russen diagrams	
	F.	Star sizes	
	G.	Binary stars	
	Н.	Mass – luminosity relation	
	I.	Variable stars	
	J.	Star clusters	
Unit IX	The Bi	th and Death of Stars	
	A.	Starbirth	
	В.	Nuclear fusion	
	C.	Brown dwarfs	
	D.	The death of stars	
	E.	Black holes	
TT : X7			
Unit X	Galaxie	es	
	A.	The Milky Way Galaxy	
	B.	A Universe of Galaxies	
	C.	Dark matter	
	D.	Hubble's Law	
	E.	Quasars and active galaxies	
	F.	Cosmology	
Course Scope a	nd Cont	ent (Laboratory):	
TT • T	р · .		
Unit I	Basic A	Astronomy Skills	
	A.	Position and Constellations	
	В.	Size and Scale in Astronomy	
	Fundam	a antala of A atran array	
Unit II	Fundamentals of Astronomy		
	А.	Kepler's Laws	
Unit III	Nature of Light in Astronomy		
	A Electromagnetic Spectrum of Light		
	л. D	Absorption and Emission Spectrum	
	D. С	Ausorption and Emission Spectra	
	C.	Properties of waves	
Unit VI	Observing		
	Observing		

- A. Observing the Sun
- B. Observing the Moon and Stars



Unit V	Planets A. B. C.	and Asteroids Planetary Systems Near Earth Objects ExoPlanets and Habitable Planets
Unit VI	Stars A. B.	Hertzsprung-Russell Diagram Blackholes
Unit VII	Galaxie A. B. C.	es and Cosmology The Milky Way Galaxy Evolution Evolution of the Universe
Outside Activit	ies:	

The students in this class will spend a minimum of 6 hours per week in addition to watching the recorded lecture videos doing the following:

- 1. Studying text and learning objectives.
- 2. Answering questions.
- 3. Skill practice.
- 4. Completing required reading.
- 5. Problem solving activity or exercise.
- 6. Written work.

Methods of Instruction:

- 1. Assign reading topics in the textbook and selected references
- 2. Videos of class lectures will be used to clarify and extend the theoretical and factual concepts present in the text
- 3. Class discussions
- 4. Audiovisual materials, relative to some unit of study will be shown to supplement lecture materials
- 5. Problem sets and questions from the text will be assigned
- 6. Visual observations will be employed so that students may see some of the objects that are emphasized in the lectures

Methods of Evaluation:

- 1. Substantial writing assignments including:
 - a. Research Reports
- 2. Computational or non-computational problem-solving demonstrations including:
 - a. Exams
 - b. Homework problems
 - c. Quizzes
- 3. Other examinations, including:
 - a. Multiple choice
 - b. Matching items
 - c. True/false items



d. Completion

Supplemental Data:

TOP Code:	191100: Astronomy
SAM Priority Code:	E: Non-Occupational
Distance Education:	Online
Funding Agency:	Y: Not Applicable (funds not used)
Program Status:	1: Program Applicable
Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class
Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	E: Credit By Exam
Eligible for Pass/No Pass:	C: Pass/No Pass
Taft College General Education:	CSB1: CSU Area B1 CSB3: CSU Area B3 IG5A: IGETC Area 5A IG5C: IGETC Area 5C LNS: Local GE Natural Science
Discipline:	Astronomy