ASTR G100L: INTRODUCTION TO ASTRONOMY LAB

Item	Value
Curriculum Committee Approval Date	04/18/2023
Top Code	191100 - Astronomy
Units	1 Total Units
Hours	54 Total Hours (Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5C Laboratory Activity (5C)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5C Laboratory Activity (5C)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B3 Laboratory Activity (B3)

Course Description

This course provides an introduction to the concepts and models used by astronomers to elucidate the natures of planets, stars, and galaxies. The practical application of methods involving the analysis of electromagnetic radiation will be emphasized. PREREQUISITE: ASTR G100 or concurrent enrollment. ADVISORY: Course taught at the level intermediate algebra or appropriate math placement. Transfer Credit: CSU; UC.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Explain the modern techniques for acquiring astronomical data, with an emphasis on spectroscopy.
3. Inventory the morphological characteristics of galaxies.
4. Solve mathematical problems concerning the analysis of planetary, stellar, and galactic data.
5. Interpret data obtained from observations of the Sun.

Course Objectives

- 1. Give a basic explanation of the properties of light, matter, and spectra.
- 2. Detail the workings of a telescope.
- 3. Explain how to observe the Sun and gather data from these observations.
- 4. Describe the composition of the Sun and the processes by which it generates light.
- 5. Explain the Doppler effect and its influence on the light emitted by stars.
- 6. Detail the motions of the bodies in our solar system.
- 7. List the important properties of stars, how these properties are measured, and how stars are classified according to their properties.
- 8. Explain the life-cycles of both low- and high-mass stars.
- 9. Describe the evolution and properties of the Milky Way.
- 10. Explain the properties of galaxies other than the Milky Way.
- 11. Classify galaxies according to their properties.
- 12. Explain the evidence supporting the Big Bang theory.

Lecture Content

Not applicable

Lab Content

Electromagnetic Radiation General considerations Spectral lines - atomic emission (element identification) Photometry of stars Doppler shift studies The Solar System Determination of the astronomical unit Determination of the masses and atmospheres of planets The composition of the sun The orbital velocity of the earth Solar observations Stars Spectral classifications of stars Analysis of proper motions Determination of selected physical stellar properties Variable stars Pulsars and the Crab nebula Galaxies Properties of the Milky Way Galaxy classifications Evaluation of the Hubble constant The quasar puzzle

Method(s) of Instruction

- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Reading Assignments

The laboratory manual and instructor-prepared handouts.

Writing Assignments

Provide written interpretations of astronomical data.

Out-of-class Assignments

Not applicable

Demonstration of Critical Thinking

Analysis of astronomical data and demonstration of how such data are correlated and used to deduce mathematical relationships. Application of astronomical models to unusual or novel situations.

Required Writing, Problem Solving, Skills Demonstration

Demonstrate techniques commonly used for the acquisition and analysis of astronomical data. Evaluate possible sources of error in astronomical data collection and analysis.

Eligible Disciplines

Astronomy: See physics/astronomy Master's degree required. Physics/Astronomy: Master's degree in physics, astronomy, or astrophysics OR bachelor's degree in physics or astronomy AND master's degree in engineering, mathematics, meteorology, or geophysics OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Kim, G. Astronomy Online Laboratory, 4th (latest) ed. Kendall Hunt, 2013 Rationale: This is the laboratory manual for this course.

Software Resources

1. MindTap Virtual Astronomy Labs. Cengage, 3.0 ed. This software involves a series of virtual astronomy labs. The labs involve real astronomical data, robust simulations, and a guiding narrative in modular segments.

Other Resources

1. Selected Sky and Telescope Laboratory Exercises 2. Instructor prepared exercises