ASTRON 4L Course Outline as of Fall 2023

CATALOG INFORMATION

Dept and Nbr: ASTRON 4L Title: SOLAR ASTRON LAB
Full Title: Solar System Astronomy Laboratory
Last Reviewed: 9/12/2022

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	1.00	Lecture Scheduled	0	17.5	Lecture Scheduled	0
Minimum	1.00	Lab Scheduled	3.00	6	Lab Scheduled	52.50
		Contact DHR	0		Contact DHR	0
		Contact Total	3.00		Contact Total	52.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 0.00 Total Student Learning Hours: 52.50

Title 5 Category:	AA Degree Applicable
Grading:	Grade or P/NP
Repeatability:	00 - Two Repeats if Grade was D, F, NC, or NP
Also Listed As:	
Formerly:	

Catalog Description:
In this course, students will analyze and interpret astronomical data. Using collaborative activities, photos, spectra, and direct observations, the student will arrive at conclusions concerning fundamental properties of the Solar System, comparative planetology, and planetary atmospheres.

Prerequisites/Corequisites:
Course Completion or Current Enrollment in ASTR 4 (or ASTRON 4)

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: In this course, students will analyze and interpret astronomical data. Using collaborative activities, photos, spectra, and direct observations, the student will arrive at conclusions concerning fundamental properties of the Solar System, comparative planetology, and planetary atmospheres. (Grade or P/NP)
Prerequisites/Corequisites: Course Completion or Current Enrollment in ASTR 4 (or ASTRON

4)
Recommended:
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**			Effective:	Inactive:
CSU GE:	**Transfer Area**			Effective:	Inactive:
	B3	Laboratory Activity		Fall 1998	
IGETC:	**Transfer Area**			Effective:	Inactive:
	5C	Fulfills Lab Requirement		Fall 1998	
CSU Transfer:	Transferable	Effective:	Fall 1997	Inactive:	
UC Transfer:	Transferable	Effective:	Fall 1998	Inactive:	

CID:

Certificate/Major Applicable:
Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should be able to:
1. Describe and use methods to interpret observable astronomical phenomena.
2. Use astronomical tools to make accurate observations.
3. Employ critical thinking to evaluate observable data.

Objectives:
At the conclusion of this course, the student should be able to:
1. Graph, analyze, and interpret planetary data.
2. Compare and contrast the planets and satellites within the Solar System.
3. Apply the fundamental properties of gravitation to draw conclusions concerning the physical characteristics and motions of planets and satellites.
4. Explain the observational techniques that are used to compute the distances, orbits, atmospheres, motions, compositions, and masses of planets and satellites.
5. Construct a model of the Earth-Moon-Sun system and utilize it to predict and explain lunar phases.
6. Identify the physical principles involved in the formation and retention of planetary atmospheres.
7. Discuss the observation techniques used to discover and study extra-solar planets.
8. Compute the rotation rate and mass of the Sun.
9. Describe the techniques used to determine the ages of planetary and satellite surfaces.

Topics and Scope:

I. Overview of the Scientific Method

II. Distances, Scales. and Units of Measure
III. Planetary Motion and Gravity
  A. Kepler's laws of planetary motion
  B. Newton’s laws of motion and gravity
  C. Calculating surface gravities of planets
IV. Terrestrial Planets
  A. Atmospheres, surface features, and other properties
  B. Seasons
  C. Life-planet relationships
  D. Evidence of liquid water
V. Jovian Planets
  A. Atmosphere, interior structure, and other properties
  B. Satellites
  C. Planetary ring systems and Roche's Limit
VI. Pluto and other Dwarf Planets
VII. Comets and Meteor Showers
  A. Anatomy of a comet
  B. Cometary orbits
  C. Comet-meteor relationships
  D. Meteors and meteor showers
VIII. Asteroids and Meteorites
  A. Asteroid classification
  B. Impacts
  C. Meteorite classification
IX. The Moon
  A. Delay in rise/set
  B. Phases
  C. Surface and interior
  D. Orbit
  E. Geologic history
X. Eclipses
  A. Types of shadows
  B. Lunar eclipses
  C. Solar eclipses
  D. Eclipse seasons and future eclipses
XI. The Sun
  A. Solar interior and atmosphere
  B. Nuclear fusion
  C. Photosphere and sunspots
XII. The Origin of the Solar System
  A. Nebular Hypothesis
  B. Age of the Solar System
XIII. Extra-Solar Planets

Additional topics may include:
XIV. Earth and Sky
  A. Celestial sphere
  B. Diurnal and annual motion
XV. Constellations and Mapping
  A. Star charts and planispheres
  B. Terrestrial and celestial coordinate systems
XVI. Optical Systems

A. Image formation
B. Lenses and mirrors
C. Telescope types
D. Cameras

Assignment:

1. Weekly reading assignments (5-10 pages)
2. Laboratory assignments (10-20)
3. Outdoor observation report(s) (1-5)
4. Quiz(zes) (0-15)
5. Exam(s) (0-4)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Outdoor observation report(s)	Writing 10 - 40%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Laboratory assignments	Problem solving 20 - 70%

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None	Skill Demonstrations 0 - 0%

Exams: All forms of formal testing, other than skill performance exams.

Exam(s), quiz(zes)	Exams 0 - 40%

Other: Includes any assessment tools that do not logically fit into the above categories.

Participation	Other Category 0 - 20%

Representative Textbooks and Materials:
Explorations: An Introduction to Astronomy. 9th ed. Arny, Thomas and Schneider, Stephen. McGraw-Hill Publishing. 2019
Observer's Handbook 2022. Edgar, James. Royal Astronomical Society of Canada. 2022
Foundations of Astronomy. 14th ed. Seeds, Michael and Backman, Dana. Brooks/Cole Publishing. 2018
A Workbook for Astronomy. 2nd ed. Waxman, Jerry. Quintessential Publishing. 2007 (classic)