ASTRON 3L Course Outline as of Spring 2011

CATALOG INFORMATION

Dept and Nbr: ASTRON 3L Title: STELLAR ASTRON LAB
Full Title: Stellar Astronomy Laboratory
Last Reviewed: 10/24/2022

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:
Stellar astronomy laboratory involves the analysis and reduction of basic astronomical data concerning stars, nebulae, and galaxies. Using collaborative activities, photos, spectra, as well as direct planetarium observations, the student will arrive at conclusions concerning fundamental properties of the universe. Topics will include electromagnetic radiation, observed properties of stars, variable and binary stars, extra-solar planets, stellar evolution, black holes, relativity, the interstellar medium, star clusters, the Milky Way and other galaxies, cosmology, and the possibility of other life forms in the universe.

Prerequisites/Corequisites:
Course Completion or Current Enrollment in ASTR 3 (or ASTRON 3)

Recommended Preparation:

Limits on Enrollment:

Schedule of Classes Information:
Description: Stellar astronomy laboratory involves the analysis and reduction of basic astronomical data concerning stars, nebulae, and galaxies. Using collaborative activities, photos,

spectra, as well as direct planetarium observations, the student will arrive at conclusions concerning fundamental properties of the universe. Topics will include electromagnetic radiation, observed properties of stars, variable and binary stars, extra-solar planets, stellar evolution, black holes, relativity, the interstellar medium, star clusters, the Milky Way and other galaxies, cosmology, and the possibility of other life forms in the universe. (Grade or P/NP)
Prerequisites/Corequisites: Course Completion or Current Enrollment in ASTR 3 (or ASTRON 3)
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

Outcomes and Objectives:
Upon completion of this course the student will:
1. Describe the fundamental properties of electromagnetic radiation and how these properties are used to discover the characteristics of stars, nebulae, and galaxies.
2. Explain the observational techniques that are used to compute distances, temperatures, brightness, motions, compositions, and masses of stars.
3. Use exponential notation to numerically describe and compare the distances, temperatures, brightness, motions, compositions, and masses of stars, nebulae, and galaxies.
4. Interpret, analyze, and graph information about the universe.
5. Describe the nuclear processes that power the stars.
6. Compute the ages of stars from their temperature-magnitude diagrams.
7. Compute the distances to star clusters from their temperature-magnitude diagrams.
8. Compute the distances to galaxies from the Hubble Law.
9. Identify the major galactic Hubble types.
10. Compute the age of the universe using the Hubble Constant.

Topics and Scope:

I. Scientific measurement methods

A. Distance units and scale
B. Uncertainty and error analysis

II. Electromagnetic radiation
A. The EM (electromagnetic) spectrum
B. Lenses and telescopes
C. Spectroscopy
D. Image processing and filters

III. Astronomical instruments
A. Properties of lenses
B. Reflecting and refracting telescopes
C. Basic telescope functions

IV. Stellar motions
A. Apparent motions
1. nightly
2. yearly
B. Doppler shift
C. Proper motion

V. Stellar distances
A. Parallax
B. Standard candles
1. Cepheid variable stars
2. Type Ia supernovae

VI. Stellar properties
A. Magnitudes of stars
B. Masses of stars
C. The spectral classification system for stars
D. The H-R (Hertzsprung-Russell) Diagram

VII. Stellar Structure and evolution
A. Nebulae and the interstellar medium
B. Ages of star clusters
C. Supernovae and the deaths of stars
D. Neutron stars and black holes

VIII. The Milky Way Galaxy
A. Properties and appearance of the Milky Way
B. The Solar System's location in the Milky Way

IX. Other galaxies
A. Hubble galaxy classification
B. The Local Group

X. Cosmology
A. The expansion of the universe and Hubble's Law
B. The fate of the universe

XI. Life in the universe

Assignment:

1. Weekly reading assignments, 5-10 pages
2. Laboratory assignments, 10-20
3. Outdoor observation reports, 1-5
4. Quizzes, 1-15

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.

Observation reports	Writing 10 - 40%

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

Lab assignments	Problem solving 20 - 50%

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.

Multiple choice, True/false	Exams 10 - 40%

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

Attendance and participation	Other Category 0 - 20%

Representative Textbooks and Materials:
A Workbook for Astronomy, Waxman, Jerry., 2ND edition, Quintessential Publishing, 2007
Foundations of Astronomy, Seeds, Michael and Backman, Dana, 11TH edition, Brooks/Cole Publishing, 2008

Explorations: An Introduction to Astronomy,Arny, Thomas, and Schneider, Stephen, 6TH edition, McGraw-Hill Publishing, 2010.

Observer's Handbook 2010, Kelly, Patrick from the Royal Astronomical Society of Canada, Thistle Printing Limited, 2009