

CUYAMACA COLLEGE OFFICIAL COURSE OUTLINE

ASTRONOMY 112 – GENERAL ASTRONOMY LABORATORY

3 hours laboratory, 1 unit

Catalog Description

Planet, stellar and lunar studies; acquaintance with constellations and astronomical coordinates; use of astronomical instruments.

Prerequisite

ASTR 110 or concurrent enrollment

Entrance Skills

Without the following skills, competencies and/or knowledge, any student entering this course will be highly unlikely to succeed:

- 1) Define and use the following terms: planet, moon, comet, constellation, Celestial Sphere, precession, seasons, astronomical unit, parsec, light-year
- 2) Use synodic and sidereal time
- 3) Use the inverse square law as it applies to light and gravity to calculate distance, mass and intensity
- 4) Identify the phases of the moon and to use them to predict the time of sunrise and sunset
- 5) Compare and contrast solar and lunar eclipses
- 6) Diagram the structure of the solar system
- 7) Explain the relationship between photons, atomic structure and spectral lines
- 8) Discuss stellar distances by using absolute and apparent magnitude and parallax
- 9) Construct a Hertzsprung-Russell diagram and to use it to analyze the evolution of stars
- 10) Compare stellar evolution models for different mass stars
- 11) Discuss galactic distances by using various distances indicators
- 12) Evaluate models of the structure and evolution of the Universe

Course Objectives

Students will be able to:

- 1) Recognize and comprehend the right ascension and declination coordinate system
- 2) Use a telescope to observe the various astronomical objects such as the Sun, Moon, Venus, Mars, Jupiter and its Galilean moons, Saturn, stars, nebula and galaxies
- 3) Explain why astronomers believe some theories to be correct, some speculative and others invalid by analyzing and evaluating the evidence that has been gathered
- 4) Identify and describe surface features of the moon
- 5) Use parallax to determine the distance to an object
- 6) Calculate the absolute magnitude of a star
- 7) Use absolute magnitude to determine the distance to a star
- 8) Identify elements by observing their spectra
- 9) Classify stars using their spectra
- 10) Construct and use a Hertzsprung-Russell diagram
- 11) Use distance indicators to obtain a mental image of the structure of the Universe

Special Materials Required of Student

Calculator

Minimum Instructional Facilities

- 1) Lab room with writing board, multimedia station, VCR/monitor, projection screen, demonstration equipment
- 2) Dark site for telescope observations

Course Content

- 1) Celestial Sphere, coordinate systems (right ascension and declination)
- 2) Lunar and solar eclipses

- 3) Planet retrograde motion
- 4) Planet orbits (study ellipses)
- 5) Lunar features
- 6) Lunar topography
- 7) Sidereal time, local mean time, mean solar time and Universal time
- 8) Apparent and absolute magnitude and parallax
- 9) Observe and identify the spectra of atoms and some molecules
- 10) Classify stars according to their spectra
- 11) Blackbody radiation curve
- 12) Hertzsprung-Russell diagram
- 13) Proper motion
- 14) Spiral arm indicators
- 15) Red shift and the expansion of the Universe
- 16) How to use a telescope
- 17) Observe the phases of the Moon and/or observe the Sun
- 18) Observe Jupiter and/or Saturn
- 19) Observe phases of Venus
- 20) Observe Mars
- 21) How to use star charts
- 22) Observe stars and multiple star systems
- 23) Observe Messier object

Method of Instruction

- 1) Integrated lecture, demonstration and discussion
- 2) Small, large group discussion
- 3) In-class activities and independent homework, research projects
- 4) Instructional slides, video presentations
- 5) Auxiliary use of study groups, peer tutoring and/or instructional office hours
- 6) Computer-facilitated instruction

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, mathematical problem solving.

- 1) Homework
- 2) In-class response to questions
- 3) Lab technique
- 4) Research paper
- 5) Quizzes, exams, final exam

Texts and References

- 1) Required (example): Seeds. Foundations of Astronomy. 4th edition, 1998.
- 2) Supplemental: None

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Locate and identify various constellations
- 2) Use the right ascension and declination coordinate system
- 3) Use a telescope to observe various astronomical objects
- 4) Debate why astronomers believe some theories to be correct, some speculative and others invalid by examining the evidence that has been gathered
- 5) Locate and identify telescopic surface features of the moon
- 6) Calculate the size of surface features of the moon
- 7) Use parallax to calculate the distance to a star
- 8) Measure apparent magnitude; calculate absolute magnitude
- 9) Measure the distance to a star by using absolute and apparent magnitude
- 10) Identify elements from their spectra
- 11) Classify stars using their spectra
- 12) Construct a Hertzsprung-Russell diagram and use it to estimate the age of globular clusters and size of stars
- 13) Calculate galactic distances using various distance indicators