

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

ASTRONOMY 110 – DESCRIPTIVE ASTRONOMY

3 hours lecture, 3 units

Catalog Description

The development of modern astronomy and its techniques with an emphasis on the vocabulary of astronomy and the current understanding of our solar system, stellar evolution, our galaxy, and the structure of the universe.

Prerequisite

None

Course Content

- 1) Celestial Sphere, motion of the Sun and planets
- 2) Phases of the Moon, lunar and solar eclipses
- 3) Origin of modern astronomy
- 4) Telescopes
- 5) How atoms generate spectra
- 6) The Sun
- 7) Determining the physical properties of stars
- 8) Binary star systems
- 9) Interstellar medium
- 10) Formation of stars
- 11) Stellar evolution
- 12) Stellar deaths
- 13) Neutron stars and black holes
- 14) The Milky Way Galaxy
- 15) Measuring the properties of galaxies
- 16) Peculiar galaxies
- 17) Cosmology (Big Bang Theory)
- 18) Origin of the Solar System
- 19) The geology of Earth
- 20) The Moon and Mercury
- 21) Venus and Mars
- 22) Jupiter and Saturn
- 23) Uranus, Neptune and Pluto
- 24) Meteoroids, asteroids and comets
- 25) Life in the Universe (optional)

Course Objectives

Students will be able to:

- 1) Recognize and define the following terms: planet, Moon, comet, meteoroid, constellation, Celestial Sphere, precession, seasons, astronomical unit, parsec, light-year.
- 2) Compare and contrast synodic and sidereal time.
- 3) Describe and explain the phases of the Moon and how the Earth, Moon and Sun are positioned.
- 4) Describe the structure of the Solar System.
- 5) Analyze and evaluate the relationship between photons, atomic structure and spectral lines.
- 6) Use the Hertzsprung-Russell diagram to explain the evolution of a star.

- 7) Analyze and explain how stars evolve.
- 8) Compare and contrast absolute and apparent magnitude.
- 9) Analyze and evaluate parallax and distance indicators.
- 10) Compare and contrast current models of galaxy types and of the evolution of galaxies.
- 11) Investigate and delineate the structure of the Universe consistent with scientific observations.
- 12) Identify and evaluate the structure of the Universe as predicted by the Big Bang Theory.
- 13) Explore and evaluate a topic in astronomy by using the Internet and/or library.

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, the symbol system.

- 1) Quizzes and exams that measure students' ability to recognize astronomical and physical concepts, situations, and the vocabulary associated with them.
- 2) Homework that measures students' ability to use the fundamental principles of astronomy and physics to answer questions concerning astronomical phenomena.
- 3) Research paper(s) in which students are required to analyze, interpret and draw conclusions from scientific sources.

Special Materials Required of Student

None

Minimum Instructional Facilities

Smart classroom with demonstration equipment

Method of Instruction

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

Out-of-Class Assignments

- 1) Reading assignments
- 2) Chapter questions
- 3) Online practice questions
- 4) Worksheets covering lecture material
- 5) Research paper

Texts and References

- 1) Required (representative example): Kaufman & Comins. *Discovering the Universe*. 11th edition. W. H. Freeman, 2019.
- 2) Supplemental: None

Exit Skills

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

- 1) Define and use the following terms: planet, Moon, comet, meteoroid, constellation, Celestial Sphere, precession, seasons, astronomical unit, parsec, light-year.
- 2) Use the inverse square law as it applies to light and gravity to calculate distance, mass and intensity.
- 3) Use synodic and sidereal time.
- 4) Identify the phases of the Moon and use them to predict time of sunrise and sunset.

- 5) Compare and contrast solar and lunar eclipses.
- 6) Diagram the structure of the Sun.
- 7) Describe how the Sun generates energy.
- 8) Diagram the structure of the solar system.
- 9) Analyze how astronomers obtain information about stars, what information can be obtained, and how the information is used.
- 10) Explain the relationship between photons, atomic structure and spectral lines.
- 11) Discuss stellar distances by using absolute and apparent magnitude and parallax.
- 12) Construct a Hertzsprung-Russell diagram and to use it to analyze the evolution of stars.
- 13) Compare and contrast stellar evolution models for different mass stars.
- 14) Discuss galactic distances by using various distance indicators.
- 15) Diagram the structure of galaxies.
- 16) Compare and contrast the classification of galaxies.
- 17) Evaluate models of the structure and evolution of the Universe.

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Use solar system structure and dynamics to explain observed solar system phenomena.
- 2) Explain how a Hertzsprung-Russell diagram is constructed and what it reveals about the evolution of stars.
- 3) Describe the structure of the Universe consistent with the Big Bang Theory, and how scientific observations have placed important constraints on the theory.