ASTR A101: PLANETARY ASTRONOMY

Item	Value
Curriculum Committee Approval Date	10/16/2024
Top Code	191100 - Astronomy
Units	3 Total Units
Hours	54 Total Hours (Lecture 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)
Associate Arts Local General Education (GE)	• Area 5 Physical and Biological Sciences, Scientific Inquiry, Life Science (OB)
Associate Science Local General Education (GE)	• Area 5 Physical and Biological Sciences, Scientific Inquiry, Life (OSB)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5A Physical Science (5A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5A Physical Science (5A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B1 Physical Science (B1)

Course Description

An introduction to the solar system. The formation and properties of planets and their satellites, dwarf planets, and other minor bodies will be examined. Insights from interplanetary missions, the discovery of extrasolar planets, and the search extraterrestrial life will be discussed. Transfer Credit: CSU; UC.

Course Level Student Learning Outcome(s)

1. Strengthen scientific literacy and numeracy skills by interpreting data and key results in planetary astronomy.
2. Examine planetary features and processes through the application of basic physical and geological principles.
3. Describe the general characteristics of extrasolar planets and compare their properties with our own solar system.

Course Objectives

- 1. Correctly apply terminology, basic facts, and concepts pertaining to the origin, structure, and evolution of the solar system.
- 2. Identify visible features of planets, moons, dwarf planets, and minor bodies from images taken by telescopes and spacecraft.
- 3. Compare and contrast the basic properties of terrestrial and giant planets.
- 4. Compare and contrast the chemical and physical processes occurring in the interiors and atmospheres of terrestrial and giant planets.
- 5. Describe the greenhouse effect and its effects on the climate of terrestrial worlds.
- 6. Differentiate between comets, asteroids and meteors.
- 7. Describe the methods used to detect extrasolar planets.
- 8. Describe the conditions necessary for life to exist in the solar system.

Lecture Content

Nature of science Size and scale of the solar system Scientific method Scientific literacy Physical principles Physics of motion Kepler's laws of planetary motion Newton's laws of motion and gravity Physics of light and matter Electromagnetic spectrum Atomic structure Spectroscopy Terrestrial planets Interior structure Geologic processes Atmospheric processes Comparative planetology Earth Moon Mercury Venus Mars Space missions to terrestrial planets Giant planets Interior structure Atmospheric processes Ring systems Comparative planetology Jupiter Saturn Uranus and Neptune Giant planet moons Space missions to giant planets Minor bodies Dwarf planets Asteroids Comets Impact events on Earth Space missions to minor bodies Planet formation Nebular hypothesis Observations supporting the model Extrasolar planets Detection methods Properties and demographics Comparison with our solar system Challenges to planet formation model Life in the Universe Conditions for life Habitable zone Potential sites for life Search for intelligent life

Method(s) of Instruction

- Lecture (02)

Instructional Techniques

Lecture and demonstrations will be used to present the basic concepts. Slide and video materials will be used to illustrate and animate some of the physical processes in planetary astronomy. Small group interaction will be applied for evaluation of the more complex materials with discussion amongst the groups. All students are provided with an environment that encourages interactive participation with the instructor. Writing assignments / proficiency demonstration.

Reading Assignments

Readings from the textbook, magazine articles, handouts (2 hours per week)

Writing Assignments

Written assignments such as papers, presentations, posters (2 hours per week)

Out-of-class Assignments

Regular homework exercises (2 hours per week)

Demonstration of Critical Thinking

1. Homework assignments and projects that extend course material and encourage individual exploration of topics. 2. Written short answers for quizzes. 3. Written exams covering the scope of the class. 4. Comprehensive final exam.

Required Writing, Problem Solving, Skills Demonstration

Homework assignments, projects, and assessments include written components as well as basic calculations.

Eligible Disciplines

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 Fraknoi, A., Morrison, D., Wolff, S.. Openstax Astronomy, ed. Rice University, 2018 2. Required Rothery, D., McBride, N., Gilmour, I.. An Introduction to the Solar System, 3rd ed. Cambridge University Press, 2018