ASTR 10A: GENERAL ASTRONOMY: SOLAR SYSTEM

Foothill College Course Outline of Record

Heading	Value
Units:	5
Hours:	5 lecture per week (60 total per quarter)
Advisory:	Concurrent enrollment in ASTR 10L.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Area III: Natural Sciences
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- Student, after taking the course, should be able to understand the difference among planets, dwarf planets, moons, comets and asteroids in our solar system.
- Students, after taking the course, should be able to understand how the planets we have discovered orbiting other stars differ from or are similar to the Earth.

Description

Non-technical introduction to astronomy, with emphasis on the planets, dwarf planets, moons, and smaller bodies which make up our solar system, as well as the scientific search for life elsewhere in the universe. Topics include the nature of light, the atom, and telescopes; an examination of the planets and their moons and rings, dwarf planets, comets, asteroids, and meteors; catastrophic events (including the impact that may have killed the dinosaurs); the search for planets and life around other stars, the challenges of space travel, and modern views on extraterrestrial contact. No background in science or math is assumed.

Course Objectives

The student will be able to:
A. demonstrate an understanding of the scientific method and how it applies to astronomy;
B. describe and contrast physical conditions on the planets, dwarf planets, and satellites in the solar system (and explain the experiments and observations that have led to our knowledge of these conditions);
C. understand the terms astronomers use and apply them correctly;
D. discuss current developments in planetary astronomy and put them in context;
E. describe impacts (collisions of smaller bodies with larger ones) in our solar system, cite the evidence for the ubiquity of these collisions, and discuss some of the consequences of these impacts;
F. understand the role of different types of telescopes, space probes, and detectors in making astronomical observations;
G. understand how the planets we have discovered around other stars are similar to or differ from the Earth;
H. understand the experiments that are currently under way to search for water and for life among the planets and the stars.

Course Content

A. Introduction to the Solar System and its Cosmic Context
B. The Nature of Science and the Scientific Method
C. How Do We Get Information About the Universe
1. Electromagnetic Radiation
2. The Spectrum and Spectroscopy
3. How We Use Radiation to Understand the Characteristics of Other Worlds (including the Doppler Shift)
4. Telescopes and Detectors
D. The Inner Planets
1. Mars Today and in the Past: How Instruments in Space and on the Planet's Surface Have Led to a New Understanding
2. Venus: Radar Results
3. The Earth-Moon System and Lunar Exploration Results
4. Mercury: Space Probe and Radar Results
E. The Giant Planets, their Satellites, and Rings
1. Jovian Planets: Observations from Earth and Space
2. Satellites of the Jovian Planets (Including Observations of Tidal Heating and its Consequences)
3. Observations of the Ring Systems
F. Dwarf Planets
1. The Discovery and Observations of Pluto and Charon
2. Discovery of Kuiper Belt Objects, Eris, and Other Dwarf Planets
3. The Consequent Redefinition of What a Planet Is
G. Comets, Asteroids, and Meteoroids
1. Asteroids in the Main Belt and Out of It
2. History of Comet Observations (Including Experiments in Space)
3. Meteors, Meteor Showers
H. Cosmic Catastrophes
1. Impacts through the Ages
2. What Killed the Dinosaurs
3. Comet Shoemaker-Levy 9 and its Collision with Jupiter
4. Could it Happen to Us and What Do We Do About It? (A Problem for Humanity as a Whole)
I. The Search for Planets Around Other Stars
1. Doppler Wiggles, Transits, and Direct Imaging of Extra-solar Planets: Interpreting the Observations and Data
2. The Puzzle of Hot Jupiters
3. Experiments to Look for Extra-solar Earths
J. The Search for Life Elsewhere in the Universe: Challenges and Solutions
1. History of Thinking About SETI
2. Experiments and Scientific Definitions About the Nature of Life
3. Experimental Searches for Intelligent Life
4. The Fermi Paradox
5. What Happens if we Succeed?: Scientific and Social Issues Around the Question: "Who Speaks for Earth?"
K. Cosmic Evolution: The Context for Understanding the Solar System

Lab Content

Not applicable.

Special Facilities and/or Equipment

A. Physics equipment for demonstrations.
B. A large classroom with good audio-visual equipment.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

A. Quizzes
B. Collaborative group activities
C. A midterm
D. Final exam
E. A term paper may or may not be required

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

A. Lecture
B. Discussion
C. Cooperative learning exercises
D. Demonstrations

Representative Text(s) and Other Materials

Fraknoi, A., D. Morrison, and S. Wolf. Astronomy. 1st ed. OpenStax Publishing, 2016.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

A. Reading Assignment Example:
1. Each topic in the course has assigned reading in the textbook related to that topic. Each week students are given specific sections of the textbook which they need to read.
B. Writing Assignment Examples:
1. Each collaborative group activity requires writing collective answers from the group.
2. Eight out of the 11 weeks there is a written homework assignment from the textbook.
3. Midterm has essay questions on two different topics.

Discipline(s)

Physics/Astronomy