

ASTR 4 Course Outline as of Summer 2025**CATALOG INFORMATION**

Dept and Nbr: ASTR 4 Title: ASTRONOMY/SOLAR SYSTEM
 Full Title: Astronomy of the Solar System
 Last Reviewed: 4/10/2023

| Units | Course Hours per Week | | Nbr of Weeks | | Course Hours Total | |
|---------|-----------------------|-------------------|--------------|------|--------------------|-------|
| Maximum | 3.00 | Lecture Scheduled | 3.00 | 17.5 | Lecture Scheduled | 52.50 |
| Minimum | 3.00 | Lab Scheduled | 0 | 6 | Lab Scheduled | 0 |
| | | 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: 105.00

Total Student Learning Hours: 157.50

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: ASTRON 4

Catalog Description:

In this course, students will receive a descriptive introduction to the Solar System including the Sun, Moon, planets, asteroids, and comets. Topics will include lunar phases, eclipses, historical geocentric and heliocentric models of the cosmos, planetary geology, planetary atmospheres and climates, the formation of the Solar System, and extrasolar planetary systems.

Prerequisites/Corequisites:**Recommended Preparation:**

Completion of MATH 150A or higher AND Completion of ENGL 100 OR EMLS 100 (formerly ESL 100)

Limits on Enrollment:**Schedule of Classes Information:**

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systems. (Grade or P/NP)

Prerequisites/Corequisites:

Recommended: Completion of MATH 150A or higher AND Completion of ENGL 100 OR EMLS 100 (formerly ESL 100)

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: |
| | C | Natural Sciences | Fall 1981 | |
| CSU GE: | Transfer Area | | Effective: | Inactive: |
| | B1 | Physical Science | Fall 1981 | |
| IGETC: | Transfer Area | | Effective: | Inactive: |
| | 5A | Physical Sciences | Fall 1981 | |
| CSU Transfer: | Transferable | Effective: | Fall 1991 | Inactive: |
| UC Transfer: | Transferable | Effective: | Fall 1991 | Inactive: |

CID:

Certificate/Major Applicable:

Major Applicable Course

COURSE CONTENT

Student Learning Outcomes:

At the conclusion of this course, the student should be able to:

1. Critically analyze astronomical observations and the scientific theories used to explain them.
2. Recognize, differentiate, and describe the various astronomical bodies within the universe, concentrating on the celestial bodies within the Solar System.
3. Explain why some astronomical bodies exhibit phases.
4. Recognize the factors affecting planetary seasons and atmospheres and relate these to Earth.

Objectives:

At the conclusion of this course, the student should be able to:

1. Define and apply the Scientific Method.
2. Compare the Solar System and its components to other celestial bodies and structures within the universe.
3. Describe the physical and orbital properties of the Jovian and terrestrial planets.
4. Identify the major contributions to astronomy made by various philosophers, natural scientists, and astronomers.
5. Construct a diagram of the Earth-Moon-Sun system to determine the Moon's phases at specific times during the lunar cycle.
6. Explain why seasons occur on Earth and other planets.
7. Describe and summarize the relationships between comets, asteroids, and meteor showers.
8. Summarize the physical properties of the major planets and their largest satellites.
9. Classify the major types of meteorites and summarize the characteristics of each.
10. Describe the structure of the Sun as well as various solar processes and phenomena.

11. Discuss the methods of detection of extrasolar planets and describe the properties of some of these recently found worlds.

Topics and Scope:

I. Overview of the Universe

- A. The nature of science
- B. Celestial bodies of the Universe
- C. Distance scales

II. History of Astronomy

- A. Historical geocentric and heliocentric models of the cosmos
- B. The Copernican revolution
- C. Kepler's three laws of planetary motion
- D. Newton's laws of motion and gravity
- E. Surface gravities of planets

III. Terrestrial Worlds: Mercury, Venus, Earth, and Mars

- A. Interiors and compositions
- B. Geological processes and surface features
- C. Atmospheres
- D. Seasons and climates
- E. Comparative planetology
- F. Exploration

IV. Jovian Worlds: Jupiter, Saturn, Uranus, and Neptune

- A. Interior structure and composition
- B. Atmosphere and cloud layers
- C. Ring systems
- D. Discovery of Uranus and Neptune
- E. Satellites
- F. Exploration

V. Pluto and Other Dwarf Planets

- A. Discovery
- B. Properties
- C. Exploration

VI. Comets and Meteor Showers

- A. Anatomy of a comet
- B. Orbital paths
- C. Historical comets
- D. Comet-meteor relationships
- E. Meteors and meteor showers

VII. Asteroids and Meteorites

- A. Asteroid classification
- B. Impacts
- C. Meteorite classification

VIII. The Moon

- A. Lunar rise/set times
- B. Phases
- C. Orbital and surface properties
- D. Geology
- E. Tides
- F. The space program

IX. Eclipses

- A. Types of shadows

- B. Lunar eclipses
- C. Solar eclipses
- D. Eclipse seasons and future eclipses
- X. The Sun
 - A. Interior and atmosphere
 - B. Nuclear fusion
 - C. Photosphere and sunspots
- XI. The Origin of the Solar System
 - A. Nebular hypothesis
 - B. Age of the Solar System
- XII. Extrasolar Planets
 - A. Methods of detection
 - B. Types and properties
 - C. Discoveries of potentially habitable worlds

Additional Topics & Scope may include:

- XIII. Earth and Sky
 - A. Celestial Sphere
 - B. Diurnal and annual motion
- XIV. Constellations and Mapping
 - A. Star charts and planispheres
 - B. Terrestrial and celestial coordinate systems
- XV. Optical Systems
 - A. Image formation
 - B. Lenses and mirrors
 - C. Telescope types
 - D. Cameras

Assignment:

1. Weekly reading from the textbook or instructor prepared materials (20-30 pages)
2. Homework assignments (5-20)
3. Research paper (0-1)
4. In-class exercise(s) (0-30)
5. Quiz(zes) and/or exams (1-30)
6. Final exam

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.

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| Homework assignments; research paper | Writing 10 - 30% |
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Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

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|--|----------------------------|
| Homework assignments; in-class exercise(s) | Problem solving 5 - 30% |
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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.

Exams and/or quizzes; final exam

Exams
60 - 80%

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

Participation

Other Category
0 - 10%

Representative Textbooks and Materials:

The Solar System. 10th ed. Seeds, Michael and Backman, Dana. Cengage Learning. 2018 (classic).

The Cosmic Perspective; The Solar System. 9th ed. Bennett, Jeffrey and Donahue, Megan and Scheider, Nicholas. Pearson. 2019.

Pathways to Astronomy. 6th ed. Schneider, Stephan and Arny, Thomas. McGraw Hill. 2020.

Openstax Astronomy 2e (Online Version). Fraknoi, Andrew, Morrison, David and Wolff, Sidney. Rice University. 2022.