El Camino College

COURSE OUTLINE OF RECORD - Official

I. GENERAL COURSE INFORMATION

Subject and Number: **Astronomy 20H**
Descriptive Title: **Honors The Solar System**

Course Disciplines: **Astronomy**

Division: **Natural Sciences**

Catalog Description: This honors course, intended for students in the Honors Transfer Program, is an introduction to the major planets and the smaller members of the solar system such as moons, asteroids, Kuiper Belt Objects, and comets. Theories of the origin and histories of the planets are presented. The early history of astronomy and the Copernican Revolution are discussed. Sky phenomena such as constellations, the seasons, eclipses, and planetary motions are demonstrated in the planetarium. The possibility of life elsewhere in the solar system is examined. Students in the honors sections are required to research and write comprehensively about the origin of the solar system.
Note: Students may take either Astronomy 20 or Astronomy 20H. Duplicate credit will not be awarded for Astronomy 20 and Astronomy 20H.

Conditions of Enrollment: **Recommended Preparation**
eligibility for English 1A

Course Length: [X] **Full Term** [ ] **Other (Specify number of weeks):**
Hours Lecture: **3.00 hours per week** [ ] **TBA**
Hours Laboratory: **0 hours per week** [ ] **TBA**
Course Units: **3.00**

Grading Method: **Letter**
Credit Status **Associate Degree Credit**

Transfer CSU: [X] **Effective Date: 10/19/2015**
Transfer UC: [X] **Effective Date: Proposed**

General Education:
El Camino College: **1 – Natural Sciences**
Term: Fall 2016 Other:

CSU GE: **B1 - Physical Science**

Term: Other:

IGETC: **5A - Physical Science without Lab**

Term: Other:

II. OUTCOMES AND OBJECTIVES

A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

1. Students will be able to recognize the elements of the Scientific Method in the discussion of a scientific problem.
2. Students will be able to explain the causes of seasonal variations in the length of the day, direction of sunrise and sunset, and the amount of solar heating on the Earth.
3. Students will be able to describe the modern theory of the origin of the planets and discuss the evidence that supports the theory.
4. Students will explain how electromagnetic radiation and astronomical instruments are used to reveal the properties of stars and planets.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at http://www.elcamino.edu/academics/slo/.

B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

1. Predict the phase of the Moon and/or type of eclipse that would be seen in the sky, given the positions of the Earth, the Sun, the Moon, and the observer.

   Essay exams
2. Explain the causes of seasonal variations in the length of day, the direction of sunrise and sunset, and the amount of solar heating.

   Essay exams
3. Identify the contributions of Eratosthenes, Aristarchus, Aristotle, Copernicus, Brahe, Kepler, Galileo, and Newton to astronomy and astrophysics.

   True/False
4. Compare the characteristics of the major planets and major moons of the solar system.

   Objective Exams
5. Estimate the age of a meteorite given data on its isotopic compostition.

   Other (specify)

   Calculation.
6. Describe the history of planet formation in our solar system.

   Essay exams
7. Describe the composition and properties of planetary atmospheres and how they evolved to their current state.

Essay exams

8. Describe and explain the climatic conditions of the terrestrial planets.

   Essay exams

9. Compare and contrast the jovial and terrestrial planets and explain why they formed where they did.

   Essay exams

10. List the places in the solar system where life is most likely to have evolved and identify why those places are the best candidates to find evidence of life.

    Objective Exams

III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	3	I	Overview of the Universe and the Scientific Method A. Spatial scales from atoms to the Universe B. Scales from atomic interactions to the age of the Universe C. Scientific Method
Lecture	9	II	Sky Phenomena A. The Celestial Sphere and Constellations B. The Seasons C. Eclipses and Phases of the Moon D. Planetary Motions
Lecture	3	III	Ancient Astronomy A. Contributions of the Greeks to Astronomy B. The Geocentric and Heliocentric Models of the Solar System
Lecture	3	IV	The Copernican Revolution A. Copernicus B. Galileo C. Tycho Brahe D. Kepler E. Newton
Lecture	6	V	Gravity and Newton's Laws of Motion A. Galileo and the Acceleration Due to Gravity B. The Law of Gravity C. Newton's Laws of Motion D. Newton's Cannon and Orbital Motion E. Surface Gravity on a Planet or Star F. Binary Stars G. Escape Speed H. The Tidal Force
Lecture	4.5	VI	Electro Magnetic Radiation A. The Electromagnetic Spectrum B. Creating Light C. Detecting Light D. Spectroscopy
Lecture	4.5	VII	The Solar System A. Layout of the Solar Sytem 1. Orbits

			2. Rotation 3. Satellite Systems B. Properties of Planets. 1. Size 2. Mass and Density 3. Magnetic Fields 4. Rotation C. Classification of the Planets D. Age of the Solar System 1. Relative Age Dating using Surface Features 2. Dating of Igneous Rocks and Meteorites using Radio-active Isotopes E. Origin of the Solar System F. The Possibility of Life in the Solar System
Lecture	12	VIII	The Terrestrial Planets and the Moon A. Structure 1. 4-Layer Structure 2. Density B. Surface Processes 1. Imact Cratering and Crater Morphology 2. Volcanism and the Types of Volcanos 3. Erosion from Water, Ice, Wind, and Landslides 4. Tectonics on Earth and Elsewhere in the Solar System C. Atmospheres 1. Composition 2. Properties 3. How the Carbon-Dioxide Cycle Stabilizes Climate D. Mercury E. Venus F. Earth G. The Moon H. Mars (past and present)
Lecture	6	IX	The Outer Planets and their Moons A. Jupiter and Saturn B. Tidal Effects 1. The Evolution of the Galilean Satellites 2. Ring Systems and the Roche Limit C. Titan and its Atmosphere D. Uranus and Neptune E. Triton and its Capture and Eventual Tidal Destruction
Lecture	3	X	Smaller Solar System Members A. Meteors, Meteoroids, and Meteorites B. Asteroids C. Ice Dwarfs 1. Pluto and Charon 2. Other Kuiper Belt Objects D. Comets and their two origins E. Impacts and their Role in the History of the Earth
Total Lecture Hours		54	
Total Laboratory Hours		0	
Total Hours		54	

IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

A. PRIMARY METHOD OF EVALUATION:

Substantial writing assignments

B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:

Figure 1 shows a comet travelling in an elliptical orbit around the Sun. The comet is shown as it moves through four different segments of its orbit (labeled A, B, C, and D). During each segment of the orbit the comet sweeps out the triangular shaped areas shaded in gray. The size of each of the areas is given. Rank the time it took (from greatest to least) for the comet to move along each of the segments of the orbit. In a one-page essay, explain your reasoning for the ranking that you made.

C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

1. Make a table showing which of the four planetary surface-shaping processes has occured in each of the planets in the solar system. With the use of photos, show examples of one process on each planet. For each planet, explain why the "missing" processes did not occur there, or have not been found there in a two-page essay.
2. Illustrate and explain why the seasons are opposite in the southern hemisphere. Include the variations in the length of the day and the locations of sunrise and sunset in a two-page essay.

D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:

Essay exams
Objective Exams
Other exams
Quizzes
Written homework
Homework Problems
Multiple Choice
Completion
Matching Items
True/False

V. INSTRUCTIONAL METHODS

Demonstration
Discussion
Group Activities
Lecture
Multimedia presentations
Other (please specify)
Planetarium demonstrations.

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. WORK OUTSIDE OF CLASS

Study
Required reading
Problem solving activities
Written work
Other (specify)
Observations of celestial phenomena

Estimated Independent Study Hours per Week: 6

VII. TEXTS AND MATERIALS

A. **UP-TO-DATE REPRESENTATIVE TEXTBOOKS**
Chaisson and McMillan. Astronomy Today. 8th ed. Pearson, 2014.

B. **ALTERNATIVE TEXTBOOKS**

C. **REQUIRED SUPPLEMENTARY READINGS**

D. **OTHER REQUIRED MATERIALS**

VIII. CONDITIONS OF ENROLLMENT

A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Requisites	Category and Justification

B. Requisite Skills

Requisite Skills

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification
Non-Course Recommended Preparation eligibility for English 1A	It is advised that students be able to read and effectively analyze college level texts, and be able to write a paper that persuasively proves an original thesis. If students are eligible for English 1A they are more likely to be successful in this course.

D. Recommended Skills

Recommended Skills
There are sufficient reading and writing requirements that the student be at a college level of reading ability. ENGL A - Read and apply critical thinking skills to college-level expository prose for the purposes of writing and discussion.ENGL 84 - Select and employ reading strategies to interpret the content of a college-level textbook, with special focus on constructing a thesis statement and providing valid support. ENGL A - Plan, write, and revise 500-word multi-paragraph expository essays including an introduction and conclusion, exhibiting coherence and unity, avoiding major grammatical and mechanical errors that interfere with meaning, and demonstrating awareness of audience, purpose, and language choice.ENGL 84 - Interpret a book-length work through discussion, journal writing, or composition writing.

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact

Course created by Perry Hacking on 03/09/2015.

BOARD APPROVAL DATE: 10/19/2015

LAST BOARD APPROVAL DATE:

Last Reviewed and/or Revised by Thanh-Thuy Bui on 03/09/2015

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