

BUTTE COLLEGE

COURSE OUTLINE

I. CATALOG DESCRIPTION

PSC 30H - Honors Introductory Astronomy

4 Unit(s)

Prerequisite(s): ENGL 2 or concurrent enrollment and Admission to the Honors Program

Recommended Prep: Math Level IV

Transfer Status: CSU/UC

51 hours Lecture

51 hours Lab

This is an Honors level course in the study of our dynamic universe. Through a process of thorough analysis, critical thinking, extended discussions, and original oral and written responses, students will establish connections between the principle-based methods of the hard sciences and our understanding of the fundamental questions of the cosmos and our place in it. Issues covered include the history of astronomy, the science of observation and discovery, stellar birth, maturation and death, planetary formation, a description of our solar system galaxies, quasars, and cosmology. Graded only.

II. OBJECTIVES

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

- A. Analyze and synthesize significant global ideas and primary original works and writing.
- B. Demonstrate critical thinking skills in seminar-type discussions.
- C. Demonstrate advanced writing skills and critical, creative thinking in composing a minimum of 5000 words in analytical papers and reading responses.
- D. Generate creative, original responses to course material.
- E. Describe the basic motion of objects we see in the sky, such as the sun, moon, stars, planets, comets, meteors and meteor showers.
- F. Discuss the basic history of astronomy to include Aristotle, Copernicus, Galileo, Kepler and Newton as well as the geocentric versus the heliocentric model.
- G. Demonstrate an understanding of the basic laws of motion, optics, and the electromagnetic spectrum related to energy, wavelength, and spectroscopy.
- H. Diagram the solar system and be able to discuss similarities and differences between Earth and other solar system bodies.
- I. Outline the process of energy production in the Sun and the path of travel of this energy to Earth.
- J. Compare and contrast the life cycle of a one solar mass star with a twenty solar mass star.

III. COURSE CONTENT

A. Unit Titles/Suggested Time Schedule

Lecture	
<u>Topics</u>	<u>Hours</u>
1. History of Astronomy	3.00
2. Gravity, Position, and Motion in the Universe	7.00
3. Light and Matter	6.00
4. Telescopes	2.00
5. The Solar System	14.00
6. The Sun and Stars	6.00
7. The Milky Way	3.00

8. Galaxies	2.00
9. Cosmology	6.00
10. Astrobiology	2.00
Total Hours	51.00

Lab

<u>Topics</u>	<u>Hours</u>
1. Basic Math Skills	3.00
2. Mapping the stars	3.00
3. Optics	3.00
4. Spectroscopy	3.00
5. Blackbody Radiation	3.00
6. Orbital Motion	3.00
7. Mapping the Solar System	3.00
8. Impact Craters	3.00
9. Atmospheres and the kinetic theory of gasses	3.00
10. Bouyancy	3.00
11. Geological processes	3.00
12. Hertzsprung-Russell diagrams	3.00
13. Stellar evolution	3.00
14. Cepheid variable stars	3.00
15. Intergalactic mapping	3.00
16. Hubble's law	3.00
17. Lines of evidence for the Big Bang	3.00
Total Hours	51.00

IV. METHODS OF INSTRUCTION

- A. Lecture
- B. Instructor Demonstrations
- C. Collaborative Group Work
- D. Class Activities
- E. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
- F. Discussion
- G. Reading Assignments
- H. Multimedia Presentations
- I. Laboratory Experiments

V. METHODS OF EVALUATION

- A. Exams/Tests
- B. Quizzes
- C. Research Projects
- D. Papers
- E. Oral Presentation
- F. Homework
- G. Lab Projects

- H. Final Examination
- I. Written Assignments
- J. Essays and research papers
- K. Class Discussion

VI. **EXAMPLES OF ASSIGNMENTS**

A. Reading Assignments

1. Read sources including NASA documents, European Space Agency releases, newspaper accounts, and other primary sources of a current incident or event and be prepared for class discussion.
2. Review and critique Ward and Brownlee's book, *Rare Earth*, and refute or support their hypothesis in a class discussion.

B. Writing Assignments

1. Research an ancient culture and write three pages about its fundamental worldview on astronomy. Discuss both the practical importance of astronomy and the importance it had for religious or other traditions.
2. Compose a 3-page essay in which you summarize a NASA mission; discuss if the mission achieved its goals and critique the cost-to-benefit of the mission.

C. Out-of-Class Assignments

1. Observe and sketch the phases of the moon every night for one month. Organize your observations and construct a comprehensive diagram showing the locations of the sun, Earth, and moon for the phases you observed on each Sunday.
2. Attend an academic seminar and/or visit an observatory or museum on a subject related to astronomy, and write a 2-page explanation of how the event reflected or challenged the concepts we have been exploring this semester.

VII. **RECOMMENDED MATERIALS OF INSTRUCTION**

Textbooks:

- A. Bennett, J., Donahue, M., Schneider, N., Voit, M. *The Essential Cosmic Perspective*. 7th Edition. Pearson Education, 2015.
- B. Hirshfield, A. *Astronomy Activity and Laboratory Manual*. 1st Edition. Jones and Bartlett, 2009.
- C. Ward, P, Brownlee, D. *Rare Earth: Why Complex Life is Uncommon in the Universe*. Copernicus Books, 2003.
- D. Primack, J., Abrams, N. *The View from the Center of the Universe*. Penguin Group, 2007.

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