

8. STUDENT LEARNING OUTCOMES

At the end of the course, the student will be able to:

1. Describe the daily, monthly, and yearly motions of the sun, moon, planets, and stars as seen from Earth. Changes in the positions of these objects with respect to time should be noted.
2. Experience the viewing of some of these objects in the sky.
3. State the differences between the geocentric and heliocentric paradigms and explain why the latter was accepted.
4. List contributions of some of the major historical astronomers including those from outside the white male stereotype.
5. Apply Newton's Laws of gravity and motion to the universe.
6. Explain energy and energy transport in the context of astronomy, especially electromagnetic radiation.
7. Describe the state, composition, and energy source of stars with special emphasis on our sun.
8. Describe the components and scale of the solar system including such objects as the planetary systems, asteroids, comets, meteors, solar wind, magnetic fields, the Kuiper belt, and the Oort cloud.
9. Describe the components and scale of the universe starting with subatomic particles and extending to the total universe.
10. Describe ways to measure distances to astronomical objects including parallax, luminosity, and redshift.
11. Analyze spectra of stars to determine their color, temperature, size, and longevity.
12. Describe the formation and evolution of stars of various sizes.
13. Discuss the emerging field of astrobiology and the search for extraterrestrial life.
14. Describe our galaxy and compare it to others.
15. State the major ideas related to Einstein's theory of relativity including spacetime, gravity, black holes, and the origin of the universe.
16. Describe the evidence for an expanding universe and discuss the past and future history of our universe.

9. TOPICAL COURSE OUTLINE:

1. Overview of modern astronomy
2. Astronomy in context: daily, monthly, and yearly cycles.
3. Copernican revolution
4. Physics of motion and gravity with astronomical implications
5. Physics of light and matter interactions with astronomical implications
6. The Solar System
7. Astrobiology and extrasolar planets
8. The Sun
9. Stellar classification and evolution
10. Supernovae, white dwarfs, and neutron stars
11. Black holes
12. The Milky Way
13. Galaxies and galaxy clusters
14. Cosmology

10. TEXTS AND MATERIALS USED: List of books and/or materials used in this course.

Bennet, J. et al. *The Cosmic Perspective 4e*. Pearson Addison-Wesley, 2006.

11. AMOUNT OF WRITING REQUIRED:

Homework problem sets and exams including conceptual questions and quantitative reasoning. Some instructors assign written projects and reports as a portion of the required classwork.

12. METHODS OF EVALUATION: (Direct and indirect)

Homework (and projects):	40%
Three unit examinations:	30%
Cumulative final exam:	30%

**13. AUTHORIZED SIGNATURE AND FILE DATE:
DEPARTMENT AND CAMPUS**

**Physical Science Department
Harold Washington College**

5/06