A survey of astronomy with emphasis on the scientific method, observation, tools of observation, and the models, physical principles, and processes that help describe and predict astronomical phenomena. Includes a laboratory component

PREREQUISITES

Math 40 or MATH 40L with a grade of C or better or satisfactory score on the math placement test.

EXPECTED STUDENT OUTCOMES IN THE COURSE

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

1. Explain the scientific method, differentiating between scientific fact and theory.
2. Evaluate scientific evidence and argument within the context of astronomy.
3. Correctly apply physical laws to the motions, positions, and attributes of various celestial bodies.
4. Describe the function and purpose of various astronomical instruments.
5. Draw appropriate conclusions based on numerical and graphical data in the context of astronomy.
6. Estimate orders of magnitude of quantities using the metric system and apply systems of units, including the metric system, correctly in solving problems in the context of astronomy.
7. Demonstrate knowledge of the historical development of astronomy.
8. Use star charts to find the locations of constellations in the sky at night.
9. Use computer programs to simulate and predict sky conditions and events.
10. Use the celestial sphere and appropriate coordinate systems to locate celestial objects and to describe and predict the positions and motions of objects in the sky relative to various positions on Earth.
11. Describe the Sun's motions relative to the celestial sphere and explain that motion in the context of a heliocentric model of our solar system in which the spheroidal Earth rotates and the Earth's axes are tilted with respect to the ecliptic plane causing seasons.
12. Describe the Earth-Moon system and explain lunar phases, eclipses, tides, and motions affected by the Earth-Moon system.
13. Summarize the evolution, structure, and scale of our solar system.
14. Describe the main layers of the sun and give a general explanation of how the sun generates energy and transfers it through various layers and across space toward the planets.
15. Use stellar measurements to analyze the motions, characteristics, and life cycles of stars.
16. Describe the interaction of the field of astronomy with technology and society.
17. Summarize the evolution, structure and scale of the universe.
CAREER AND TECHNICAL EDUCATION PROGRAM OUTCOMES
Specify which Career and Technical program outcomes, if any, are substantially addressed by the course by completing the “Career and Technical Education template” to show the relationship between course and program outcomes to assessment measures.

CLASS-LEVEL ASSESSMENT MEASURES
Student accomplishment of expected student outcomes may be assessed using the following measures. (Identify which measures are used to assess which outcomes.)

1. Quizzes (1-7, 11-17)
2. Examinations (1-7, 11-17)
3. Laboratory activities (1-6, 8-12, 15)
4. Assigned homework (1-6, 11-17)
5. In-class discussions (1-3, 7, 11-14, 16-17)
6. Written reports (1-2, 7, 13, 16-17)

GENERAL EDUCATION OUTCOMES (ESO)
Specify which general education outcomes, if any, are substantially addressed by the course. Numbers in parentheses identify the Expected Student Outcomes linked to the specific General Education Outcome.

4. Interpret and apply quantitative and/or qualitative information embedded in text, real-life situations, tables, or graphs to analyze complex situations and/or solve quantitative or qualitative problems. (Assessed in 2013)

DISCIPLINE OUTCOMES
Specify which discipline outcomes, if any, are substantially addressed by the course.

1. Analyze physical phenomena by correctly applying relevant conservation laws.
3. Given an experimental scenario, critique the method and results based on accepted scientific methods and principals.
4. Relate course topics to personal experience and societal and environmental issues.
Individual instructors may order this outline as fits the needs of their individual courses. In addition, they may place more emphasis on some areas than on others. What is assured is that this particular list is covered in the course. Other topics may be added to a course as the instructor sees fit, and as time and interest allow. An *asterisk can be used to mark an item as optional.

I. Fundamentals of studying astronomy
   a. Observing the night sky
   b. Gravity and physical laws
   c. Light, blackbody radiation and spectra
   d. Telescopes and other tools

II. The solar system
   a. The Earth and moon system
   b. The inner planets
   c. The outer planets
   d. Asteroids, meteoroids and comets
   e. The sun

III. The stars
   a. Measurements, processes and nature of stars
   b. Lifecycle of stars
   c. Death of stars
   d. Black holes

IV. Galaxies and the universe
   a. The Milky Way Galaxy
   b. Galaxies
      i. Quasars*
      ii. Active Galaxies*
   c. Cosmology
   d. Extraterrestrial Life*