

COURSE OUTLINE
ASTR-114
Elementary Astronomy Lab
1 Credit
Science Core Course

HOWARD COMMUNITY COLLEGE

Description

In this course the student will acquire elementary observational, measurement, and experimental experiences in astronomy. The student will utilize the metric system to measure given objects, make a simple telescope, plot the moon's orbit from phase photos, identify spectral lines, use a microcomputer for simulations and CAI, make and record observations of the sunset location and moon's phases for several weeks, etc. Experiments will be performed to demonstrate scientific concepts used in astronomy. At least one night time observation is required. Prerequisite: Eligible to enroll in MATH-070; Pre- or Co-requisite: ASTR-104. (2 hour lab)

Statement on General Education and Liberal Learning

A liberal education prepares students to lead ethical, productive, and creative lives and to understand how the pursuit of lifelong learning and critical thinking fosters good citizenship. General education courses form the core of a liberal education within the higher education curriculum and provide a coherent intellectual experience for all students by introducing the fundamental concepts and methods of inquiry in the areas of mathematics, the physical and natural sciences, the social sciences, the arts and the humanities, and composition. This course is part of the general education core experience at Howard Community College.

Overall Course Objectives

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

1. Identify bright stars, major constellations and visible planets during an evening observation and locate their position using a constellation finder.
2. Given stellar spectra and data, plot stars on an H-R Diagram.
3. By experimentation and collection of data, measure angular size using a cross-staff.
4. Plot the moon's orbit from lunar phase photos.
5. Measure objects using the metric system.
6. Identify basic operational principles of reflector and refractor telescopes.
7. Use a reflector or refraction telescope to locate an object in the sky.
8. Apply astronomy principles to solve simple related problems, e.g., Kepler's Law.
9. Identify spectral lines from: (a) photos to classify the stellar type (b) gases and substances to identify them.
10. Utilize a microcomputer for simulation, such as the 3-body problem with a triple star system and measuring the mass of Jupiter using data from its Galilean moon's motion.
11. Participate on a field trip to a site of astronomical interest such as NASA at Goddard.
12. Draw each solar system object (planets, sun and moons) to scale for both size and distance.

Major Topics: Lab Activities for Day Class

- I. Course Intro, Angular Size and Measurement, Parallax
- II. Celestial Sphere and Measurements - Time, Stellar Location, etc.
- III. Kepler's Laws; Metric System Activities
- IV. Constellations and Identification; Using A Star Finder
- V. Spectra and Spectroscopes
- VI. Telescopes and Terminology; Sunset Location (4 week observation)
- VII. Plotting the Moon's Orbit
- VIII. Drawing Solar System to Scale
- IX. Goddard Space Flight Center Field Trip
- X. Investigating the 3-Body Problem (computer simulation)
- XI. Story of Our Universe (video)
- XII. Spectral Classification and Hertsprung-Russel Diagram
- XIII. Planetary Construction Set (computer simulation)

Course Requirements

Grading/exams: Grading procedures will be determined by the individual faculty member, but will be calculated on the basis of homework assignments and lab experiments.

Writing: Specific writing assignments will be determined by the individual faculty member, but will include writing in logs and lab reports.

Other Course Information

This course is a Science Core Course, a Science elective and an Arts and Sciences elective.