

NORTHWESTERN CONNECTICUT COMMUNITY COLLEGE
COURSE SYLLABUS

Course Title: Introduction to Astronomy with Lab

Course #: AST 111

Course Description: 4 semester hours (3 class hours/2 laboratory hours).

Lecture: An introduction to the basic concepts of classical and modern astronomy and its application utilizing hands-on experiences. Topics include the principles of celestial coordinate systems; telescope design and use; fundamental physical laws and their applications; the evolution of stars, galaxies, and the universe; modern cosmology; and astrobiology. Use of computers is an integral part of this course.

Lab: Lab section to accompany AST* 111 lecture. Students develop a working knowledge of the night sky through hands-on experiences with direct observations, computer simulations and applied use of a telescope.

Pre-requisites/Co-requisites:

- MAT* 095 or satisfactory scores on the placement exam; and,
- ENG* 063 and ENG* 073, or ENG* 093, or satisfactory scores on placement exams.

Text: Comins, Neil F. and William J. Kauffman, III. *Discovering the Universe*. 10th ed. New York: W.H. Freeman, 2014. Print.

Goals:

To provide the student with a basic overview of astronomy including: coordinate systems (declination and right ascension); the ecliptic; seasons, calendar, and time; basic constellations of various cultures throughout history; the Earth, its moon, and their motions; properties of light; optics and the telescope; the solar system, its planetary bodies, and the Sun; general principles of stars including classification, interpretation, and life cycle; the Milky Way and other galaxies; dark energy; cosmology; astrobiology

Outcomes (Lecture): After completion of this course, students should be able to:

- Explain the coordinate systems of declination and right ascension
- Describe the ecliptic
- Summarize some of the mythology behind the constellations/groupings
- Demonstrate how a telescope works
- Describe the basic principles of optics
- Compare and contrast between reflecting and refracting telescopes
- Identify the spectrum for each element of the stars
- Describe parallax and apply it
- Explain what is meant by a Hertzsprung-Russell Diagram
- Describe the principle of astronomical units (A.U.)
- Diagram different features of the sun
- Differentiate between the different types of stars and classify the sun
- Summarize the historical evolution of the varying models of the solar system
- Recognize the difference between planets and stars
- Differentiate between each of the planets of our solar system and their major moons
- Summarize how gravitational pull affects planets
- Recognize the various types of galaxies
- Explain the Doppler Effect
- Identify black holes and describe their properties
- Explain the principle of dark energy in relationship to cosmology
- Describe some of the principles and theories of astrobiology

Outcomes (Lab): After completion of this course, students should be able to:

- Identify the parts and safely/properly use a telescope to observe the night sky
- Predict stars' temperature from their observation

- Identify constellations
- Use a star chart
- Explain the phases of the moon
- Scale the solar system
- Compare the size of the sun and the moon
- Identify and classify galaxies looking through telescopes and on the internet
- Scale galaxies using relative measures
- Interpret an H-R diagram
- Interpret which direction stars are moving (relative to Earth) in addition to their composition and surface temperature
- Safely view the sun using a variety of techniques
- Measure sunspots and their motions
- Analyze solar flares
- Access and utilize a solar observation website