Virginia Western Community College
NAS 131
Astronomy I

Prerequisites

A placement recommendation for ENG 111, co-enrollment in ENF 3/ENG 111, or successful completion of all developmental English requirements.

Course Description

Studies the major and minor bodies of the solar system, stars and nebulae of the Milky Way, and extragalactic objects. Examines life and death of stars, origin of the universe, history of astronomy, and instruments and techniques of observation. This is an introductory astronomy course that emphasizes concepts rather than mathematics. The course is designed for non-science majors and there are no math prerequisites. The main goal of this course is for students to understand and appreciate the nature of science through the study of astronomy. After completing this class, students will have achieved a basic understand of: scientific method, the structure of scientific revolutions, patterns in the night sky, motion, energy, gravity and light, telescopes, our solar system and properties of planets beyond our solar system. Hands on telescope will be utilized to allow students a real time experience of astronomical observation.

Semester Credits: 4 **Lecture Hours: 3** **Laboratory Hours: 3**

Required Materials

A scientific calculator

Textbook:
Horizons, Exploring the Universe, Seeds/Backman, 14th edition ISBN: 9781337816526

Course Outcomes

At the completion of this course, the student should be able to:

- Demonstrate improvement in critical thinking by applying the scientific method to fact and theory in classroom learning, activities, and assignments.
- Understand the reasons geocentrism was widely believed for 2000 years and identify the primary evidence that led to the replacement of geocentrism by heliocentrism.
- Describe the overall structure and individual components of the solar system.
- Describe the solar system's origin.
- Explain the historical development and multi-cultural aspects of the practice of science generally and astronomy specifically.
- Outline the technical development of modern astronomy and space exploration.
- Generate or expand global awareness by integrating astronomy's cosmic, worldwide and multi-cultural perspectives of earth with insights gained from its historical development and scientific and societal impacts.

- Identify the contributions made to astronomy by the following people: Aristotle, Ptolemy, Copernicus, Kepler, Galileo, and Newton.
- Identify the phases of the moon and their causes.
- Identify the causes of eclipses.
- Relate the historical development of man's view of the universe from the Geocentric Model to modern interpretations.
- Identify the laws which describe and govern planetary motion and qualitatively predict the implications of these laws (Kepler's laws and Newton's law of gravitation).
- Describe and account for the physical properties of the Earth such as structure, surface features, and the composition and evolution of the atmosphere.
- Describe the motions of the Earth and relate them to our system of time keeping (daily, monthly, seasonally and yearly).
- Compare and contrast the terrestrial and jovian planets including the following: interior structure, surface features, atmospheres, satellites and rings, magnetic fields.
- Identify the planets based on their unique significant properties and describe those properties.

Topical Description

PART I: EXPLORING THE NIGHT SKY

Chapter 1: Here and Now

- Where Are You? When Is Now? Why Study Astronomy?

Chapter 2: A User's Guide to the Sky

- The Stars. The Sky and Celestial Motion. The Cycles of the Sun. Astronomical Influences on Earth's Climate.

Chapter 3: Cycles of the Moon

- The Changeable Moon. Lunar Eclipses. Solar Eclipses. Predicting Eclipses.

Chapter 4: The Origin of Modern Astronomy

- Geocentrism vs. Heliocentrism. Aristotle, Copernicus, Galileo, Kepler, and the Newtonian Synthesis.

Chapter 6: Light and Telescopes.

- Radiation: Information from Space. Telescopes. Observations on Earth: Optical and Radio. Airborne and Space Observatories. Astronomical Instruments and Techniques. Nonelectromagnetic Astronomy.

PART II: THE STARS

Chapter 7: Atoms and Spectra

- Atoms. Interactions of Light and Matter. Understanding Spectra.

Chapter 8: The Sun

- The Solar Atmosphere. Solar Activity. Nuclear Fusion in the Sun. Perspective: Origins.

PART IV: THE SOLAR SYSTEM

Chapter 19: The Origin of the Solar System

- The Great Chain of Origins. A Survey of the Solar System. The Story of Planet Building. Planets Orbiting Other Stars.

Chapter 20: Earth

- The Standard of Comparative Planetology. A Travel Guide to the Terrestrial Planets. Earth as a Planet. The Solid Earth. Earth's Atmosphere.

Chapter 21: The Moon and Mercury

- Comparing Airless Worlds. The Moon. Mercury.

Chapter 22: Comparative Planetology of Venus and Mars

- Venus. Mars. The Moons of Mars.

Chapter 23: Jupiter and Saturn

- A Travel Guide to the Outer Solar System. Jupiter. Jupiter's Moons and Rings. Saturn. Saturn's Moons and Rings.

Chapter 24: Uranus, Neptune, and the Kuiper Belt

- Uranus. Neptune. The Kuiper Belt.

Chapter 25: Meteorites, Asteroids, and Comets

- Meteoroids, Meteors, and Meteorites. Asteroids. Comets. Asteroid and Comet Impacts.

PART V: LIFE

Chapter 26: Astrobiology; Life on Other Worlds

- The Nature of Life. Life in the Universe. Intelligent Life in the Universe.

Notes to Instructors

1. The construction of simple astronomical instruments can be accomplished with a minimum of resources. These can include Astrolabe, Planisphere, Sundial, Solar Viewer, and Spectroscope. Most of these instruments can be taken home by students.

2. Grades from some combination of the following will be used to determine each student's final course grade: Laboratory exercises, class participation, homework assignments, papers, projects, oral presentations, and exams. Exams may be multiple choice, some combination of multiple choice and short answer or essay, or purely essay and/or short answer. A final exam is required and must constitute no less than 25% of the course grade. Individual instructors may determine the relative weightings of the other components in determining the grade for the course, and must state the weightings to be used in determining student grades in the course syllabus.