

Virginia Western Community College

NAS 132

Astronomy II

Prerequisites

NAS 131

Course Description

Introduces astronomy of the stars, including the Sun, celestial objects, stellar formation and death and cosmology, and the study of the universe as a whole. Includes discussions of the development of astronomy through the ages, recent discoveries and experience with the types of mathematical principles employed and the astronomical observational skills essential for an understanding of the fundamental principles of astronomy and cosmology. Assignments require fluency in arithmetic, unit conversion, basic algebra, geometry, and trigonometry. This course is cross-listed with PHY 142. Credit will not be awarded for both.

Semester Credits: 4

Lecture Hours: 3

Laboratory Hours: 3

Required Materials

A scientific calculator

Textbook:

The Essential Cosmic Perspective. Bennett, Donahue, Schneider and Voit. 9th Edition. Pearson Publishing. ISBN: 9780135794982 or 9780135795033

Course Outcomes

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

- Learn how a star is born and what makes star bright.
- Understand terminology: apparent brightness, absolute brightness, luminosity, stellar spectra.
- Understand the star's internal structure and the process of nuclear fusion.
- Learn, compare and identify the types of stars according to their temperature, color, mass and size.
- Understand how these characteristics relate to age.
- Describe the difference between low-mass and high-mass stars.
- Recognize information about a star from their position in the Hertzsprung–Russell Diagram.
- Identify life stage: pre-main sequence, main sequence, and post-main sequence.
- Learn what binary stars are and how it affects stellar evolution of each star.
- Learn what variable stars are.

- Learn and differentiate the different stages of the end of life cycle of star: white dwarf, nova, supernova, massive supernova, neutron star, pulsar and black hole.
- Learn about galaxies.
- Understand how galaxies move within the universe.
- Learn the different types, properties and evolution of galaxies: spiral, elliptical, and irregular galaxies.
- Learn about Milky Way Galaxy: its discovery, structure, spiral arms and star formation
- Learn about the Super Massive Black Hole that is in the center of the Milky Way Galaxy.
- Understand the distances among galaxies and the Hubble law.
- Understand the implications to the size and behavior of the Universe and space.
- Learn the Big Bang Theory.
- Explain how the Universe changed with time.
- Understand the evidence supporting the Big Bang Theory.
- Learn what dark matter and dark energy are and its implication to the fate of the Universe.
- Understand the life in the universe: requirements for life to survive.
- Describe about habitable zones in extrasolar planets.
- Learn about the Drake equation.
- Learn about SETI and the search for extraterrestrial life.

Topical Description

PART 4: Stars

Chapter 11: Our Star

Chapter 12: Surveying the Stars

Chapter 13: The Star Stuff

Chapter 14: The Bizarre Stellar Graveyard

PART 5: Galaxies and Beyond

Chapter 15: Our Galaxy

Chapter 16: A Universe of Galaxies

Chapter 17: The Birth of the Universe

Chapter 18: Dark Matter, Dark Energy, and the Fate of the Universe

PART 6: Life on Earth and Beyond

Chapter 19: 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.

[ADA Statement \(PDF\)](#)

[Title IX Statement \(PDF\)](#)