

# Astronomy Courses

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**ASTR 1103 - Introductory Astronomy Lab**

Hours: 1

This lab course is designed to give students a hands-on approach to learning about the Solar System, stars, and galaxies using techniques similar to those used by modern astronomers. Laboratory activities will include using the planetarium to learn the names and locations of stars and constellations, hands-on experiments, and computer simulations.

**ASTR 1303 - Stars and the Universe**

Hours: 3

This course is designed for non-science majors. A descriptive survey of astronomy with emphasis on modern developments in stellar and galactic astronomy and the role of physical science in the measurement and interpretation of astronomical data. Included are studies of structure and evolution of stars and galaxies and of current cosmological theories

**ASTR 1304 - Solar System**

Hours: 3

A descriptive survey of the solar system specifically including the sun, planets and their satellites, comets, and other members of the solar system. The course will also examine the history of astronomy and the development of scientific tools for understanding the nature of the solar system.

**ASTR 120 - Life in the Universe**

Hours: 3

The basic science of the search for evidence of life in the universe, including the origin and evolution of life on the Earth, terrestrial extremophiles, the history of the search for life in the Universe, the search for habitable environments in the Solar System, and the search for habitable (exo-)planets and signs of life around other stars.

**ASTR 203 - Stars and the Universe for STEM Majors**

Hours: 3

A mathematically-guided overview of modern astronomy, including the scientific method; fundamental physical laws; the formation of planets; stars; galaxies; introduction to cosmology. Instructor approval required for students who have taken ASTR 1303. Prerequisites: Concurrent or previous enrollment in ASTR 1103.

**ASTR 260 - Archaeoastronomy**

Hours: 3

A course designed to study specific ancient structures and their associations with astronomical events. Topics will include many ancient sites including Paleolithic structures like Stonehenge, Mayan, Aztec, Native American culture, and the pyramids of Egypt.

**ASTR 310 - Observational Astronomy**

Hours: 4

Astronomical observation techniques and analysis of data including practical experience with modern telescopes and imaging devices, computer-based reduction and analysis, and interpretation of astronomical data. Prerequisites: ASTR 1303 or ASTR 1304 or ASTR 120.

**ASTR 337 - Contemporary Frontiers in Astronomy**

Hours: 3

Current and engaging areas of astronomical research, including our Solar System, extra-solar planets, cosmology, dark matter, and dark energy. Students will engage in evidence-based discussions, explore up-to-the minute scholarly articles, and apply concepts of basic physics to illuminate the current limits of astronomical knowledge. Prerequisites: (ASTR 1303 or ASTR 203) and (ASTR 1304 or ASTR 120) with consent of instructor.

**ASTR 410 - Stellar Structure and Evolution**

Hours: 3

The leading observational facts about stars as interpreted by current theories of stellar structure and evolution. Equations of stellar structure, energy generation and nucleosynthesis, opacity and equation of state, radiative and convective transport, stellar atmospheres and emergent spectra, stellar evolution and stellar end states. Prerequisites: ASTR 203 and Co/Prerequisite (PHYS 321 or PHYS 333).

**ASTR 418 - Undergraduate Research**

Hours: 3

Individual research related to physics, directed by a faculty member. Prerequisites: Department head approval.

**ASTR 420 - Galaxies and Cosmology**

Hours: 3

The basic observations, physical properties, and evolution of galaxies, active galactic nuclei, and large scale structure. Topics also include the Big Bang theory, basic equations of cosmology, inflation, dark matter and dark energy, and observational techniques used in testing these hypotheses. Prerequisites: ASTR 203 and Co/Prerequisite (PHYS 321 or PHYS 333).

**ASTR 450 - Nuclear Astrophysics**

Hours: 3

Nuclear astrophysics describes the elemental and energy production in stars via nuclear reactions. It explains the occurrence of all the naturally occurring chemical elements in the universe from the simplest elements to the most complex. It also explains how astrophysical neutrinos (from the sun, cosmic rays and supernovae) are produced and detected and what they have to say about both neutrinos and the universe. Nuclear astrophysics also describes how the structure of compact stars (e.g. neutron stars) arises due to the interactions of protons, neutrons, electrons, and quarks and gluons. The course will also explain how the Universe evolved from a primordial state to the present including a discussion of the abundances of the observed elements.

**ASTR 489 - Independent Study**

Hours: 1-4

Independent Study 1-4 hours.

**ASTR 490 - Honors Thesis**

Hours: 3

Honors Thesis.

**ASTR 491 - H Ind Honors Readings**

Hours: 3

H Ind Honors Readings.

**ASTR 497 - Special Topics**

Hours: 0-4

Special Topics. One to Four semester hours. Organized class. May be repeated when topics vary. Some sections are graded on a Satisfactory (S) or Unsatisfactory (U) basis.