

Astronomy Courses (Physics and Astronomy) (ASTR)

ASTR Courses

This is a list of courses with the subject code ASTR. For more information, see Physics and Astronomy (College of Liberal Arts and Sciences) in the catalog.

ASTR:1000 First-Year Seminar 1 s.h.

Small discussion class taught by a faculty member; topics chosen by instructor; may include outside activities (e.g., films, lectures, performances, readings, visits to research facilities).

ASTR:1060 Big Ideas: Origins of the Universe, Earth, and Life 3 s.h.

Origin of the universe, the biochemistry of life, and the origin of life on Earth; for non-science majors. Recommendations: first-year or sophomore standing. GE: Natural Sciences without Lab. Same as BIOL:1060, SEES:1060.

ASTR:1070 Stars, Galaxies, and the Universe 3-4 s.h.

Students survey topics including the Sun; life cycles of stars including black holes and pulsars; diversity of galaxies including the Milky Way and distant quasars; cosmology—the history, structure, and fate of the universe; current results from recent astronomical observations; for non-science majors. Recommendations: closed to physics and astronomy majors. GE: Natural Sciences with Lab; Natural Sciences without Lab.

ASTR:1079 Introductory Astronomy Laboratory 1 s.h.

Laboratory for ASTR:1070. GE: Natural Sciences Lab only.

ASTR:1080 Exploration of the Solar System 4 s.h.

Survey of the solar system; topics include physical properties of the planets, comets, and asteroids; origin of the solar system; search for extrasolar planetary systems; search for life in the universe; current results of recent planetary space missions; night sky observation; for non-science majors. Recommendations: closed to physics and astronomy majors. GE: Natural Sciences with Lab.

ASTR:1085 Citizen Astronomy 3 s.h.

Survey of topics in astronomy and astrophysics; topics include the Solar System and exoplanets, nearby stars in the Galaxy, distant galaxies and unseen black holes; focus on citizen science projects that allow students to examine real data; for non-science majors. GE: Natural Sciences without Lab.

ASTR:1771 Fundamental Astronomy I: The Solar System and Exoplanets 4 s.h.

Quantitative introduction to physical principles needed to understand astronomical phenomena (e.g., laws of motion, gravitation, radiation), astronomical instrumentation, properties structure, and evolution of solar system bodies, exoplanets, and the search for life. Requirements: four years of high school math. GE: Natural Sciences with Lab.

ASTR:1772 Fundamental Astronomy II: Evolution of Stars, Galaxies, and the Universe 4 s.h.

Continuation of ASTR:1771; quantitative introduction to stellar, Galactic, and extragalactic astronomy; topics include the Sun, stellar evolution, stellar corpses such as neutron stars and black holes, the Milky Way galaxy, the interstellar medium, galaxies, cosmology, and fate of the universe. Prerequisites: ASTR:1771. Requirements: four years of high school math. GE: Natural Sciences with Lab.

ASTR:2991 Reading in Astronomy arr.

Selected topics in astronomy.

ASTR:3771 Introduction to Astrophysics I 3 s.h.

Topics include celestial mechanics, radiative transfer, stellar structure and evolution, and star formation; first in a two-semester sequence. Prerequisites: PHYS:2704 and ASTR:1772 and ASTR:1771 and (MATH:2850 or MATH:3550) and (MATH:2700 or MATH:2550). Recommendations: computer programming experience.

ASTR:3772 Introduction to Astrophysics II 3 s.h.

Continuation of ASTR:3771; topics include post-main-sequence stellar evolution, stellar remnants, close binary stars, the Milky Way and other galaxies, active galactic nuclei, galaxy evolution, and cosmology; second in a two-semester sequence. Prerequisites: ASTR:3771.

ASTR:4850 Observational Techniques in Astronomy 3 s.h.

Introduction to instruments of optical (and sometimes multi-wavelength) astronomy and basic skills needed for carrying out observational astronomical research; hands-on use of observing equipment; nighttime observing sessions. Prerequisites: PHYS:2704 and ASTR:1772 and ASTR:1771.

ASTR:4996 Reading in Astronomy arr.

ASTR:6782 Extragalactic Astronomy 3 s.h.

Normal and active galaxies, large scale structure, the early Universe, cosmology.

ASTR:6785 The Interstellar Medium 3 s.h.

The interstellar medium; optical properties of small interstellar grains, radiative processes in interstellar gas, structure of HII regions, interstellar shock waves, supernova remnants, modification of interstellar medium by luminous stars, molecular clouds.

ASTR:6790 Stellar Astrophysics 3 s.h.

Stellar interiors, nuclear astrophysics; advanced topics.

ASTR:6870 Radiative Processes in Astrophysics 3 s.h.

Explores how electromagnetic radiation is generated and transported in astronomical systems, serving both as a driver of change and a key source of information; emphasis on using radiation processes to understand the physics of free charges, atoms, and molecules from a classical perspective, with links to quantum mechanics; topics include bremsstrahlung, Compton scattering, synchrotron radiation, and resonant interactions in atoms, molecules, and nuclei, including fine and hyperfine magnetic effects.

ASTR:6880 High Energy Astrophysics 3 s.h.

Detection of X-rays and gamma-rays, black holes and neutron stars, accretion onto compact objects, pulsars, supernova remnants, cosmic rays, and gamma-ray bursts.

ASTR:7775 Special Topics in Astrophysics 1-3 s.h.

Advanced lectures.

**ASTR:7830 Space and Astrophysical Plasma
Physics** **3 s.h.**

Dynamics and evolution of space and astrophysical plasmas;
heliosphere, planetary magnetospheres, accretion disks;
plasma waves, shock waves, turbulence.

**ASTR:7970 Seminar: Astrophysics and Space
Physics** **arr.**

Current research.

ASTR:7991 Research: Astronomy **arr.**

Original research in observational, theoretical astronomy.