

ASTR-ASTRONOMY

ASTR 1504 Astronomy: Exploring the Universe 4 Credit Hours

An introduction to the concepts of modern astronomy. The solar system, the sun and stars, the Milky Way and other galaxies, current theories of the origin, evolution and fate of the universe. Not for major credit. Students cannot receive credit in both 1504 and 1514. (F, Sp, Su) [II-NL].

ASTR 1514 Astronomy: Exploring the Universe with Laboratory 4 Credit Hours

An introduction to the concepts of modern astronomy. The solar system, the sun and stars, the Milky Way and other galaxies, current theories of the origin, evolution, and fate of the universe. Not for major credit. Students cannot receive credit in both 1504 and 1514. Laboratory (F, Sp, Su) [II-LAB].

ASTR 1523 Life in the Universe 3 Credit Hours

Introductory astronomy course focusing on general physical conditions under which life is thought to arise and evolve in the universe. Topics include historical astronomy, gravitation and planetary orbits, the solar system. The earth's geology and atmosphere, stellar evolution, theories for the origin of life on earth, the discoveries of extrasolar planets, and the search for extraterrestrial life. Course is not for major credit in physics and astronomy, however it is appropriate for Journalism and Mass Communications, Zoology, Education and Chemistry majors as well as others who want an introduction to our current understanding of life in the universe. (Sp) [II-NL].

ASTR 2513 Introductory Astrophysics 3 Credit Hours

Prerequisite: PHYS 1215 or 2524, or permission of instructor. An introduction to solar system astronomy and basic astrophysical concepts for majors and students with a knowledge of introductory physics and calculus. Includes planetary system formation, asteroids, comets, terrestrial planets and giant planets. Astrophysical concepts including Keplers laws, blackbody radiation, hydrostatic equilibrium and heat transfer. Elements of astronomy, including time, celestial coordinates, telescopes and detectors, magnitudes and color indices. (F)

ASTR 2970 Special Topics/Seminar 1-3 Credit Hours

Special Topics. 1 to 3 hours. May be repeated; Maximum credit nine hours. Special topics course for content not currently offered in regularly scheduled courses. May include library and/or laboratory research, and field projects. (Irreg.)

ASTR 3103 Stars 3 Credit Hours

Prerequisite: 2513 or permission of instructor. Stellar properties and stellar evolution. Includes fundamental properties of stars (temperature, luminosity, mass) and how to determine them, star formation, main sequence, post main sequence, supernovae, black holes, neutron stars, white dwarfs, binary stars. (F)

ASTR 3113 Galaxies and Cosmology 3 Credit Hours

Prerequisite: 2513 or permission of instructor; 3103 strongly recommended. Galactic and extragalactic astronomy. Includes the Milky Way galaxy, the interstellar medium, normal and active galaxies, clusters of galaxies, cosmology. (Sp)

ASTR 3190 Topics in Astronomy 1-3 Credit Hours

1 to 3 hours. Prerequisite: permission of instructor. May be repeated with change of subject matter; maximum credit nine hours. (F, Su)

ASTR 3440 Mentored Research Experience 3 Credit Hours

0 to 3 hours. Prerequisites: ENGL 1113 or equivalent, and permission of instructor. May be repeated; maximum credit 12 hours. For the inquisitive student to apply the scholarly processes of the discipline to a research or creative project under the mentorship of a faculty member. Student and instructor should complete an Undergraduate Research & Creative Projects (URCP) Mentoring Agreement and file it with the URCP office. Not for honors credit. (F, Sp, Su)

ASTR 3960 Honors Reading 1-3 Credit Hours

1 to 3 hours. Prerequisite: Admission to Honors Program. May be repeated; maximum credit six hours. Consists of topics designated by the instructor in keeping with the student's major program. The topics will cover materials not usually presented in the regular courses. (F, Sp, Su)

ASTR 3970 Honors Seminar 1-3 Credit Hours

1 to 3 hours. Prerequisite: admission to Honors Program. May be repeated; maximum credit six hours. Subjects covered vary. Deals with concepts not usually treated in regular courses. (Irreg.)

ASTR 3980 Honors Research 1-3 Credit Hours

1 to 3 hours. Prerequisite: admission to Honors Program. May be repeated; maximum credit six hours. Provides an opportunity for the gifted Honors candidate to work at a special project in the student's field. (F, Sp, Su)

ASTR 3990 Independent Study 1-3 Credit Hours

1 to 3 hours. Prerequisite: one course in general area to be studied; permission of instructor and department. May be repeated; maximum credit six hours. Contracted independent study for topic not currently offered in regularly scheduled courses. Independent study may include library and/or laboratory research and field projects. (Sp, Su)

ASTR G4303 Stellar Astrophysics 3 Credit Hours

Prerequisite: 3113 or permission of instructor. Physics of stars: gas and radiation laws, stellar atmospheres and spectra, stellar interiors and evolution. (F)

ASTR 4523 Advanced Observatory Methods 3 Credit Hours

Prerequisite: 2513 and 3103. Techniques of multiwavelength observational astronomy. Includes time and coordinates, physics of astronomical ccds, telescopes, photometry, extinction correction, technical feasibility calculations, optical spectroscopy, and x-ray astronomy. Introductions to gamma-ray, infrared, UV radio astronomy. No student may earn credit for both 4523 and 5523. (Irreg.)

ASTR 4960 Directed Readings 1-4 Credit Hours

1 to 4 hours. Prerequisite: good standing in University; permission of instructor and dean. May be repeated; maximum credit four hours. Designed for upper-division students who need opportunity to study a specific problem in greater depth than formal course content permits. (Irreg.)

ASTR 4970 Special Topics/Seminar 1-3 Credit Hours

1 to 3 hours. Prerequisite: Senior standing or permission of instructor. May be repeated; maximum credit nine hours. Special topics or seminar course for content not currently offered in regularly scheduled courses. May include library and/or laboratory research and field projects. (Irreg.)

ASTR 4990 Independent Study 1-3 Credit Hours

1 to 3 hours. Prerequisite: three courses in general area to be studied; permission of instructor and department. May be repeated; maximum credit six hours. Contracted independent study for topic not currently offered in regularly scheduled courses. Independent study may include library and/or laboratory research and field projects. (F, Sp, Su)

- ASTR 5403 High-Energy Astrophysics 3 Credit Hours**
Prerequisite: 4303 or permission of instructor. High-energy radiation processes in astronomy: synchrotron radiation, bremsstrahlung, inverse Compton-effect. New wavebands of observation, UV, X-ray and gamma-ray astronomy. Radioastronomy: supernova remnants, pulsars, neutron stars. Radiogalaxies, active galactic nuclei, quasars. Theories of the origin of cosmic rays. (Irreg.)
- ASTR 5443 Galactic Astronomy 3 Credit Hours**
Prerequisite: 4303 or permission of instructor. Basic properties of galaxies are explored with special focus on the Milky Way. Topics include galaxy classification and morphology, stellar populations, clusters and kinematics, interstellar medium, distributions of mass and light, spiral structure, chemical evolution, systemic rotation and galaxy mass, and distance-determining methods. (Irreg.)
- ASTR 5453 Extragalactic Astronomy and Cosmology 3 Credit Hours**
Prerequisite: 3113 or 4303 or permission of instructor. Basic properties of stars. Review of observational tools for extragalactic work. Stellar content and interstellar medium in normal galaxies. Introduction to the theory of Big Bang cosmology. Comparison of observational data to cosmological predictions. The extragalactic distance scale and the age of the universe. Large scale structure: galaxy clusters and superclusters. Active galaxies – radio galaxies and quasars. (Irreg.)
- ASTR 5463 Stellar Atmospheres 3 Credit Hours**
Prerequisite: 4303 or permission of instructor. Local thermodynamic equilibrium. Radiative transfer, continuous absorption coefficient and model stellar atmospheres. Atomic and molecular spectroscopy and the quantitative analysis of stellar spectra. Atomic processes and departures from local thermodynamic equilibrium. Extended and expanding atmospheres, novae, supernovae. (Irreg.)
- ASTR 5473 Stellar Interiors 3 Credit Hours**
Prerequisite: 4303 or permission of instructor. Evolution and energy balance of stars including gravitational attraction, nucleosynthesis, radiative and convective energy, transport and equilibrium, construction of stellar models for pre-main sequence and main sequence stars, and the theory of giants and white dwarfs. (Irreg.)
- ASTR 5513 Interstellar Medium 3 Credit Hours**
4303 or permission. Processes in low-density media are explored, including the physics relevant to emission line objects such as HII and HI regions, molecular clouds, and active galaxies. Techniques for deriving chemical abundances are explored, as are interstellar absorption by gas and dust and radiation transfer. (Irreg.)
- ASTR 5523 Advanced Observatory Methods 3 Credit Hours**
Prerequisite: 2513 and 3103. Techniques of multiwavelength observational astronomy. Includes time and coordinates, physics of astronomical ccds, telescopes, photometry, extinction correction, technical feasibility calculations, optical spectroscopy, and x-ray astronomy. Introductions to gamma-ray, infrared, UV radio astronomy. No student may earn credit for both 4523 and 5523. (Irreg.)
- ASTR 5900 Seminar in Astrophysics 3 Credit Hours**
Prerequisite: permission of instructor. May be repeated with change of subject matter; maximum credit nine hours. A research seminar devoted to the study of specialized topics in astronomy and astrophysics. Topics selected will reflect the interest of the instructor and students. (Irreg.)
- ASTR 5960 Directed Readings 1-3 Credit Hours**
1 to 3 hours. Prerequisite: graduate standing and permission of department. May be repeated; maximum credit twelve hours. Directed readings and/or literature reviews under the direction of a faculty member. (F, Sp, Su)
- ASTR 5970 Special Topics/Seminar 1-3 Credit Hours**
1 to 3 hours. Prerequisite: Graduate standing or permission of instructor. May be repeated; maximum credit nine hours. Special topics or seminar course for content not currently offered in regularly scheduled courses. May include library and/or laboratory research and field projects. (Irreg.)
- ASTR 5990 Independent Study 1-3 Credit Hours**
1 to 3 hours. Prerequisite: Graduate standing and permission of instructor. May be repeated; maximum credit nine hours. Contracted independent study for a topic not currently offered in regularly scheduled courses. Independent study may include library and/or laboratory research and field projects. (Irreg.)