ASTRONOMY

AST 100 A Survey of the Universe (4 Credits)
Discover how the forces of nature shape our understanding of the cosmos. Explore the origin, structure and evolution of the Earth, moons and planets, comets and asteroids, the Sun and other stars, star clusters, the Milky Way and other galaxies, clusters of galaxies, and the universe as a whole. Designed for nonscience majors. Enrollment limited to 50. {N}
Fall

AST 102 Sky and Time (4 Credits)
This course explores the astronomical roots of clocks and calendars, and relies on both real and simulated observations of the Sun, Moon and stars. In addition to completing weekly projects based on collecting and interpreting data, students independently research a clock and a calendar from another culture, either ancient or modern. There are no prerequisites, and students from all disciplines and backgrounds are welcome. Enrollment limited to 25. {N}
Spring

AST 103 Sky and Telescopes (3 Credits)
Discover how astronomers know about the universe by observing the light that comes to us from distant objects. View the sky with your naked eye, binoculars, and a small telescope. Take pictures with a professional telescope, and examine astronomical images. Designed for non-science majors. Enrollment limited to 20. {N}
Fall

AST 104 Alien Worlds (4 Credits)
This course explores the study and search for extraterrestrial worlds. Students examine in detail our own solar system, the formation and evolution of planets, planets outside of our solar system (known as exoplanets) and the architecture of planetary systems. This course investigates the detection techniques developed by astronomers to discover and characterize exoplanets. Questions of what makes a planet habitable, the possibility for extraterrestrial life and the potential for the discovery of extraterrestrial life in the future are explored. This course examines how science works, emphasizing that science is a dynamic process and not just a set of facts. {N}
Fall, Spring, Variable

AST 111 Introduction to Astronomy (4 Credits)
A comprehensive introduction to the study of modern astronomy, covering planets their origins, orbits, interiors, surfaces and atmospheres; stars their formation, structure and evolution; and the universe its origin, large-scale structure and ultimate destiny. This introductory course is for students who are planning to major in science or math. Prerequisite: MTH 111 or equivalent. {N}
Fall

AST 113 Telescopes and Techniques (4 Credits)
An introduction to observational astronomy for students who have taken or are currently taking a physical science class. Become proficient using the telescopes of the McConnell Rooftop observatory to observe celestial objects, including the Moon, the Sun, the planets, stars, nebulae and galaxies. Learn celestial coordinate and time-keeping systems. Find out how telescopes and digital cameras work. Take digital images of celestial objects and learn basic techniques of digital image processing. Become familiar with measuring and classification techniques in observational astronomy. Not open to students who have taken AST 103. Enrollment limited to 20. {N}
Spring

AST 214 Astronomy & Public Policy (4 Credits)
This course explores the intersection of physical science, social science, psychology, politics and the environment. How do scientists, decision makers and the public communicate with each other, and how can scientists do better at it? What should the role of scientists be in advocacy and social movements? How does scientific information influence lifestyle and behavior choices among the public at large? The course focuses on three topics with close ties to astronomy: (1) global climate change, which involves basic atmospheric physics; (2) light pollution, which wastes billions of dollars per year and ruins our view of the starry sky without providing the safety it promises; and (3) controversial development of mountaintop observations such as the Thirty Meter Telescope on Mauna Kea, HI. Throughout the course students develop science communication skills using proven techniques borrowed from theater. Prerequisite: one college science course in any field and MTH 111 or the equivalent. {N}{S}
Fall, Spring, Alternate Years

AST 226 Cosmology (4 Credits)
This course begins with the discovery of the expansion of the universe, and moves on to current theories of the expansion. Students consider cosmological models and topics in current astronomy that bear upon them, including the cosmic background radiation, nucleosynthesis, dating methods, determination of the mean density of the universe and the Hubble constant, and tests of gravitational theories. Prerequisites: (AST 100 or AST 111) and MTH 111, or equivalent. {N}
Fall, Spring, Alternate Years

AST 228 Astrophysics I: Stars and Galaxies (4 Credits)
A calculus-based introduction to the properties, structure, formation and evolution of stars and galaxies. The laws of gravity, thermal physics and atomic physics provide a basis for understanding observed properties of stars, interstellar gas and dust. We apply these concepts to develop an understanding of stellar atmospheres, interiors and evolution, the interstellar medium, and the Milky Way and other galaxies. Prerequisites: two semesters of college-level physics and second-semester calculus. {N}
Spring

AST 235 Introduction to Stellar Structure (4 Credits)
A calculus-based introduction to the observations and theoretical understanding of the structure and evolution of stars. Topics include astrometry, photometry, spectroscopy, the Planck function of thermal emission, cause of spectral emission and absorption lines, Boltzmann and Saha distributions of atomic energy levels and ionization states, the Hertzprung Russell diagram, binary stars and stellar mass determination, nuclear energy generation in stars, hydrodynamic equilibrium, equations of state, and the fates of stars. Prerequisites: [(PHY 117 and PHY 118) or PHY 119] and MTH 112. {N}
Fall

AST 337 Observational Techniques in Optical and Infrared Astronomy (4 Credits)
This course provides an introduction to the techniques of gathering and analyzing astronomical data, with an emphasis on optical observations related to studying stellar evolution. Students use Smith's telescopes and CCD cameras to collect and analyze their own data, using the Python computing language. Topics covered include astronomical coordinate and time systems; telescope design and optics; instrumentation and techniques for imaging and photometry; astronomical detectors; digital image processing tools and techniques; atmospheric phenomena affecting astronomical observations; and error analysis and curve fitting. Prerequisites: at least one of AST 226 or AST 228, and one physics course at the 200-level. Previous experience in computer programming is strongly recommended. {N}
Fall

AST 400 Special Studies (1-4 Credits)
Independent research in astronomy. The student is expected to define their own project and to work independently, under the supervision of a faculty member. Admission by permission of the department.
Fall, Spring

AST 430D Honors Project (4 Credits)
Available to qualified students ready for rigorous independent work. Students are expected to define their research project and work in close consultation with an adviser. Full-year course.
Fall