

Astronomy & Astrophysics (AA)

Courses

AA 101 Current Topics in Astrophysics 1 Credit (2,0)

Survey seminar exploring contemporary astrophysics-related research and career topics. Development of knowledge, skills, and awareness of discipline standards, including tackling complex science problems. Critical thinking, time management, study skills, internships, student organizations, and university services.

Prerequisites: Must be an BSAA major

AA 316 Introductory Astronomy and Astrophysics I 3 Credits (3,0)

A physics-based introduction to the structure and evolution of the physical universe. The Solar System (Earth, Moon, Sun, and planets), planets orbiting other stars, astrobiology, star formation, stellar evolution, stellar nucleosynthesis, and exotic objects such as white dwarfs, neutron stars, and black holes.

Corequisites: PS 227 or PS 160

AA 317 Introductory Astronomy and Astrophysics II 3 Credits (3,0)

A physics-based instruction to the structure and evolution of the physical universe. Structure and history of our Milky Way galaxy, elliptical, spiral, and dwarf galaxies, galaxy clusters, active galactic nuclei, cosmology, the Big Bang, and primordial nucleosynthesis.

Prerequisites: AA 316

AA 318 Introductory Astrophysics Laboratory 1 Credit (0,1)

One three-hour laboratory session per week, to supplement the existing Introductory Astronomy and Astrophysics I/II sequence (AA 316, AA 317) in order to provide an introductory astronomy laboratory as preparation for the existing senior level Observational Astronomy course (AA 425) and make available at an early stage an observationally intensive astronomy experience for technical students with a passion for astronomy and astrophysics.

AA 345 Astrophysics and Space Science Seminar 2 Credits (2,0)

Seminar-style course, with lectures, readings, and writings on topics of current interest in Astrophysics and Space Science.

Prerequisites: AA 317

AA 401 Stellar Astrophysics 3 Credits (3,0)

Basic physical processes operating in the stars: stellar structure and stellar evolution.

Prerequisites: AA 317

AA 402 Interstellar Medium and Galaxies 3 Credits (3,0)

Physical processes in the interstellar medium in the Milky Way Galaxy and other galaxies including: interstellar dust and gas, the formation of protostars, pre-main sequence evolution, the morphology, kinematics, and Galactic Center of the Milky Way, the Hubble sequence, spirals and irregular galaxies, spiral structure, elliptical galaxies, galaxy interactions and formation.

Prerequisites: AA 401

AA 403 Cosmology and the Structure of the Universe 3 Credits (3,0)

Current relativistic cosmological models, age and distance scales in the universe, the hot big bang, primordial nucleosynthesis, inflation, baryonic and non-baryonic matter, galaxy formation and evolution, dynamics of structure formation, cosmic microwave background fluctuations, and observational constraints on the parameters of different models describing the Universe. Emphasis will be placed on observations that motivate, measure, and test the standard Lambda-CDM world model.

Prerequisites: AA 401

AA 420 Planetary Interiors, Surfaces, and Atmospheres 3 Credits (3,0)

Planets in our solar system: their origin, evolution, composition, interiors, surfaces, atmospheres, and magnetospheres. Planetary meteorology, mineralogy (including meteorites), surface geology and morphology, interior structure and magnetic fields and how experiments, spacecraft missions, observations, and remote sensing aid in determination of our knowledge of these features.

Prerequisites: PS 303 and AA 316

AA 422 Solar System Dynamics 3 Credits (3,0)

Dynamics of planetary systems: formation and dynamical evolution of our solar system, including the dynamics of the planets, small bodies, satellites, and planetary rings. Solar system (and exo-solar system) stability, orbital perturbations and resonances, three-body problem, orbital dissipative forces, small body collisions and size-distributions. Asteroid and comet physical properties.

Prerequisites: PS 303 and AA 316

AA 425 Observational Astronomy 3 Credits (2,1)

Basic design and use of an optical telescope, fundamentals of astronomical optics including refracting and reflecting systems, principles and applications of optical filters and adaptive optics. Design optimization and trade-offs in an observing system. Telescope system calibration. Digital observation techniques and analysis of images of the moon, planets, stars, nebulae, and galaxies. Electronic imaging including quantification of radiant energy, spectroscopy, and techniques for reducing the effects of noise sources.

Prerequisites: PS 303 and PS 305 and AA 317 and AA 318

AA 430 Astronomical Optics and Instrumentation Laboratory 3 Credits (1,2)

Optical methods in astronomy, research and technology. Advanced laboratory techniques involving topics in the optics and design of astronomical instrumentation: telescopes, photometers, spectrometers, interferometers. Extensive hands-on experience in breadboarding and using optical systems.

Prerequisites: EP 320 and AA 318

AA 492 Senior Astrophysics Project 3 Credits (3,0)

Optional capstone course for senior Astronomy and Astrophysics students. Students will carry out their senior research project in an area of interest that overlaps the interest of the supervising faculty.

Prerequisites: EP 440 and CGPA or 3.5 or greater