

Astronomy Elective Courses

- **275. Extragalactic Astrophysics II**

Units: 4

Lecture, three hours. Perturbation theory in expanding universe. Cosmological recombination. Nonlinear structure formation. Dark matter halos. Cosmological simulations. Galaxy surveys through cosmic time. Stellar populations. Models of galaxy formation. Galaxies and supermassive black holes. Letter grading.

- **276. Instrumentation and Observational Techniques**

Units: 4

Lecture, three hours. Telescopes, optical principles, cameras, and spectrographs. Optical detectors; photomultiplier tubes, CCDs. Infrared detectors and arrays. Radio detectors. X-ray and gamma-ray detectors. Interferometry and aperture synthesis. Data analysis techniques. Statistical methods. Letter grading.

- **282. High-Energy Astrophysics**

Units: 4

Lecture, three hours. Interactions of high-energy photons with matter. Telescopes and detectors (X-ray, gamma-ray, and radio). Accretion. Supernovae and gamma-ray bursts. Compact objects. Active galactic nuclei. Particle acceleration and cosmic rays. Dark matter, gravitational waves, neutrino astronomy. Letter grading.

- **283. Numerical and Statistical Methods**

Units: 4

Lecture, three hours. Topics selected by instructor in mathematical, numerical, and statistical methods of relevance to modern astrophysical research. Topics include Fourier transforms, filtering, and power spectra, numerical algorithms, N-body codes, maximum likelihood, Bayesian inference, and error estimation. Letter grading.

- **286. Exoplanets: Properties, Origin, and Evolution**

Units: 4

Lecture, three hours. Detection and statistics of extrasolar planets. Theories of planet formation. Structural and dynamical evolution of planets. Signatures and consequences of evolution. Interior and atmospheric structure. Relationship between planets and smaller bodies. Habitable zones. Letter grading.