ASTRONOMY AND ASTROPHYSICS

Department of Physics and Astronomy
College of Natural Science

101 The Celestial Clockworks
Spring. 1(1-0)
Relationship between ancient skylore and timekeeping. Establishment of a calendar and celestial navigation. Development of the Greek horoscope as a time recorder and coordinate system.

207 The Science of Astronomy
Fall. 3(3-0) P:M: (PHY 231 or concurrently) or (PHY 231B or concurrently) or (PHY 181B or concurrently) or (PHY 183 or concurrently) or (PHYS 231B or concurrently) or (PHYS 271 or concurrently) or (PHYS 231C or concurrently) and (MTH 116 or concurrently) or (MTH 114 or concurrently) or (LBS 117 or concurrently) Not open to students with credit in AST 201.
In-depth study of one topic in astronomy with emphasis on key discoveries. Topics may be cosmology, the solar system, and the life of stars. Observing with portable telescopes.

208 Planets and Telescopes
Spring. 3(2-0) P:M: (PHY 183 or PHY 183B or PHY 193H) and (MTH 132 or MTH 152H or LBS 118) RB: AST 207 Not open to students with credit in AST 303.

301 Junior Research Seminar
Fall, Spring. 1(1-0) P:M: Completion of Tier I writing requirement.
Preparation and presentation of a review paper on a current topic in astronomy or astrophysics.

303 Planetary System Astronomy
Fall of even years. 3(3-0) P:M: (PHY 183 or PHY 193H or PHY 183B) and (MTH 132 or MTH 152H or LBS 118) SA: AST 201
Origin and nature of the solar system. Planets of the solar system and other star systems. Asteroids, meteorites, and comets. Determination of time and celestial coordinates.

304 Stars
Fall of even years. 3(3-0) P:M: AST 208 and PHY 215 and (PHY 321 or concurrently) SA: AST 401

307 The Milky Way
Fall of odd years. 3(3-0) P:M: (PHY 183 or PHY 193H or PHY 183B) and (MTH 132 or MTH 152H or LBS 118) SA: AST 202

308 Galaxies and Cosmology
Spring of odd years. 3(3-0) P:M: AST 208 and PHY 215 and (PHY 321 or concurrently) SA: AST 402

310 Directed Studies
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Approval of department.
Individual study or project in astronomy or astrophysics under the direction of a faculty member.

312 Observational Astronomy
Spring, 1(0-2) P:M: AST 303 or AST 307
Basic observational techniques in astronomy. Stellar photometry and spectroscopy.

410 Senior Thesis
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 5 credits in all enrollments for this course. P:M: (AST 301) and completion of Tier I writing requirement.
Design and execute an original experiment or computation. A written and oral report of the research is required.

800 Research Methods
Fall, Spring, Summer. 2(0-3) A student may earn a maximum of 12 credits in all enrollments for this course. P:M: (AST 101) and completion of Tier I writing requirement.
Design and execute an original experiment or computation. A written and oral report of the research is required.

805 Research Project
Fall, Spring. 3(0-3) A student may earn a maximum of 6 credits in all enrollments for this course. P:M: PHY 820 or PHY 841
Experimental foundations, theory, and applications of gravitational physics and general relativity. Tests of the equivalence principle, modern solar system tests of general relativity, Schwarzschild metric, Hawking effect, Einstein's field equations.

860 Gravitational Astrophysics
Fall. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. RB: PHY 820 and PHY 841
Experimental foundations, theory, and applications of gravitational physics and general relativity. Tests of the equivalence principle, modern solar system tests of general relativity, Schwarzschild metric, Hawking effect, Einstein's field equations.

861 Cosmology
Spring. 3(3-0) R: Open only to graduate students in the Department of Physics and Astronomy. SA: AST 860A
Current research in cosmology: observational basis for the Big Bang, the cosmic background radiation, primordial nucleosynthesis, content and distribution of matter, cosmic geometry, growth of perturbations.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open only to graduate students in the Astronomy and Astrophysics major.
MS Thesis Research.

911 Numerical Techniques in Astronomy
Fall. 3(3-0) A student may earn a maximum of 36 credits in all enrollments for this course. R: Open only to graduate students in the Astronomy and Astrophysics major.
Numerical techniques for large datasets.

912 Observational Astronomy
Spring of even years. 2(2-0) P:M: PHY 820 or approval of department SA: AST 820
Numerical solutions to key problems in astronomy and astrophysics. N-body gravitational calculations, hydrodynamics in astronomy, radiative transfer, and techniques for large datasets.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 120 credits in all enrollments for this course. R: Open only to doctoral students in the Astronomy and Astrophysics major.
Doctoral dissertation research.

850 Electrodynamics of Plasmas
Spring of odd years. 3(3-0) Interdepartmental with Electrical and Computer Engineering and Physics. Administered by Electrical and Computer Engineering. RB: ECE 835 or PHY 488 SA: EE 850

860 Gravitational Astrophysics
Fall. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. RB: PHY 820 and PHY 841
Experimental foundations, theory, and applications of gravitational physics and general relativity. Tests of the equivalence principle, modern solar system tests of general relativity, Schwarzschild metric, Hawking effect, Einstein's field equations.

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