

829 Capstone Seminar in Health and Humanities
 Spring. 2(2-0) R: Approval of college.
 Peer review of master's theses completed or near completion. Recent works in interdisciplinary approaches to health and humanities.

830 Introduction to African American and African Studies I
 Fall. 3(3-0) RB: Courses in African American or African Studies. R: Open to students in African American and African Studies.
 Varied approaches to the study of African peoples and the origins and evolution of the Black experience in the United States. Critical examination of the social, economic, and cultural conditions of blacks in the United States.

831 Introduction to African American and African Studies II
 Spring. 3(3-0) RB: Courses in African American or African Studies. R: Open to students in African American and African Studies.
 Comparative examination of the global black experience. Exploration of the intersecting experiences of blacks, Latinos, Asian and Pacific Islanders, and American Indians in the United States.

832 Supervision Seminar in African American and African Studies
 Spring. 3(3-0) R: Open only to Ph.D. students in African American and African Studies.
 Supervision and mentoring for doctoral students in African American and African Studies who are working with undergraduate students in AL 495.

840 Writing in the Sciences
 Fall, Spring, Summer. 2(2-0) A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with Natural Science. Administered by Natural Science.
 Discussion and critique of students' writing in peer response workshop groups

881 Special Topics in Teaching with Technology in Arts and Humanities
 Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: Familiarity with Macintosh or Windows platform.
 Teaching with technology in the arts and humanities. Implications of technology for learning strategies and course design, disciplinary and cross-disciplinary applications of technology, testing on the Web, implications of broader access to knowledge for student research and writing, and distance learning.

890 Independent Study
 Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of college.
 Special projects, directed reading, and research arranged by an individual graduate student and a faculty member in areas supplementing regular course offerings.

893 Museum Internship
 Fall, Spring, Summer. 2 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. Interdepartmental with History of Art. Administered by Department of Art and Art History. R: Open only to juniors or seniors or graduate students.
 Activities, functions and organization of a museum.

893A Internship in African American and African Studies
 Fall, Spring, Summer. 1 to 2 credits. RB: Courses in African American or African Studies. R: Open to students in African American and African Studies.
 Field work in an organization or institution in the Black Diaspora. Direct and practical involvement in the community.

898 Master's Research
 Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course.
 Directed research in support of Plan B Master's program requirements

899 Master's Thesis Research-Plan A
 Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 15 credits in all enrollments for this course.
 Directed research leading to a master's thesis, used in partial fulfillment of plan A master's degree requirements.

999 Doctoral Dissertation Research
 Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 50 credits in all enrollments for this course.
 Doctoral dissertation research.

ASIAN LANGUAGES ASN

**Department of Linguistics and Germanic, Slavic, Asian and African Languages
 College of Arts and Letters**

290 Independent Study
 Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Approval of department.
 Special projects in an Asian Languages arranged by an individual student and a faculty member in areas supplementing regular course offerings.

291 Special Topics in Asian Languages
 Fall. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course. Not open to students with credit in ASN 491.
 Special topics supplementing regular course offerings proposed by faculty on a group study basis.

401 East Asian Cultures (W)
 Fall. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. P:M: (IAH 211B) and completion of Tier I writing requirement. SA: AL 401
 Selected topics in the history and culture of China, Japan, and Korea. Topics vary.

464 Studies in the Literature of Asia and the Asian Diaspora (W)
 Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. Interdepartmental with English. P:M: Completion of Tier I writing requirement.
 Selected writers, genres, themes, or regions in Asian and Asian diasporic literature.

490 Independent Study
 Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to juniors or seniors. Approval of department.
 Special projects in Asian Languages arranged by an individual student and a faculty member in areas supplementing regular course offerings.

491 Special Topics in Asian Languages
 Fall, Spring. 1 to 6 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to juniors or seniors. Approval of department.
 Special topics supplementing regular course offerings proposed by faculty on a group study basis.

ASTRONOMY AND ASTROPHYSICS AST

**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 ISP 205 or concurrently or PHY 181B or concurrently or PHY 183 or concurrently or PHY 183B or concurrently or LBS 271 or concurrently or PHY 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.

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.

Audiology and Speech Sciences—ASC

304 Stars
Spring of odd years. 3(3-0) P:M: (PHY 184 or PHY 184B or PHY 294H) and (AST 303) and (MTH 234 or concurrently or MTH 254H or concurrently or LBS 220 or concurrently) SA: AST 401

Physical processes that determine the structure and evolution of stars. Observations of stars and star clusters. Spectra of stars.

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

Structure and history of the Milky Way Galaxy. Stellar populations. Interstellar medium.

308 Galaxies and Cosmology
Spring of even years. 3(3-0) P:M: (AST 307) and (PHY 184 or PHY 184B or PHY 294H) and (MTH 234 or concurrently or MTH 254H or concurrently or LBS 220 or concurrently) SA: AST 402

Structure and content of galaxies beyond the Milky Way. Active galaxies and quasars. The expanding universe. Modern cosmological models.

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. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. RB: (AST 801)
Apprenticeship in astrophysical research; student will work closely with individual faculty member learning research techniques.

801 Introduction to Astrophysics
Fall. 3(3-0)
Survey of contemporary astrophysics. Stellar evolution, the structure of the Milky Way, the properties of external galaxies, and cosmology.

802 Techniques of Modern Astrophysics
Fall, Spring. 3 credits. RB: (AST 801)
Students are introduced to modern astrophysics through participation in short projects involving literature surveys, professional planning, and research in observational, theoretical, and computational astrophysics.

810 Radiation Astrophysics
Spring of odd years. 3(3-0) RB: (AST 801 and PHY 841)

Transfer of radiation through plasmas and processes for emission and absorption of photons. Interpretation of the spectra of stars, interstellar medium, and galaxies.

820 Advanced Topics in Astrophysics
Fall, Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. RB: (AST 801)

Advanced work in a specialized astrophysical topic.

830 Galactic and Extragalactic Dynamics
Fall of even years. 3(3-0) RB: (AST 801 and PHY 820)

Implications of gravitational dynamics and stellar evolution on galactic and extragalactic systems.

840 Stellar Astrophysics
Spring of even years. 3(3-0) RB: (AST 801)
Physics of stellar interiors. Methods for calculating stellar models. Principles of stellar evolution.

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

Plasma kinetic and macroscopic plasma transport theory. Electromagnetic wave propagation and charged particle diffusion processes in plasma. Electromagnetic energy absorption via elastic and inelastic collisions. Dc, rf, and microwave discharges.

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.

870 Astronomical Instrumentation and Data Analysis
Fall of odd years. 3(3-0) RB: (AST 801)
Theory and techniques of astronomical data acquisition and analysis.

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 Astronomy and Astrophysics.
MS Thesis Research

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 Astronomy and Astrophysics.
Doctoral dissertation research.

AUDIOLOGY AND SPEECH SCIENCES ASC

Department of Audiology and Speech Sciences College of Communication Arts and Sciences

113 Oral Communication Principles and Skills
Fall, Spring, Summer. 3(2-2)
Study, development and enhancement of oral communication skills including speech, voice, language and listening.

203 Introduction to Communication Sciences and Disorders
Fall, Spring. 3(3-0) Not open to students with credit in ASC 403.

Survey of research and practice regarding speech, hearing and language disorders in children and adults.

214 Anatomy and Physiology of the Speech and Hearing Mechanism
Fall. 4(3-2) P:M: (ASC 203 or concurrently)

Structural and functional analyses of the central and peripheral auditory mechanisms, and of the respiratory, phonatory, and articulatory mechanisms for speech.

232 Descriptive Phonetics
Fall. 2(1-2)
Principles of speech production. Transcription of speech using the International Phonetic Alphabet.

303 Hearing Science
Fall. 3(2-2) P:M: (MTH 106 or MTH 152H or MTH 110 or MTH 201 or MTH 116 or STT 200 or MTH 124 or STT 201 or MTH 132) RB: Completion of one ISP course. SA: ASC 255

Physical and psychological aspects of sound and their measurement. Emphasis on the understanding of human communication and its disorders.

313 Speech Science
Spring. 3(2-2) P:M: (ASC 214 and ASC 232) SA: ASC 255

Processes underlying the production and perception of speech. Emphasis on the understanding of human communication and its disorders.

333 Oral Language Development
Fall, Spring. 3(3-0) P:M: (PSY 101) and (LIN 401 or ENG 302 or LIN 200) R: Not open to freshmen.

Development of receptive and expressive aspects of child language.

344 Evaluation Procedures in Audiology
Fall. 4(3-2) P:M: (ASC 255) and completion of Tier I writing requirement. R: Open only to juniors or seniors in the Department of Audiology and Speech Sciences.

Classification of hearing disorders. Behavioral and electrophysiological measurement of hearing, including subjective and objective testing procedures.