

**Descriptions—Astronomy and Astrophysics  
of  
Courses**

**ASTRONOMY AND  
ASTROPHYSICS**

**AST**

**Department of Physics and  
Astronomy  
College of Natural Science**

**201. Astrophysics and Astronomy I**

Fall. 3(4-0)  
P: PHY 183 or PHY 183B or PHY 193H; MTH 132 or MTH 152H.

Overview of the universe: the celestial sphere, orbits, spectra, the solar system, stars, and stellar evolution. QP: PHY 28, 7 PHY 291H, MTH 113 QA: AST 229, AST 217

**202. Astrophysics and Astronomy II**

Spring. 4(3-12)  
P: AST 201; PHY 184 or PHY 184B or PHY 294H; MTH 234 or MTH 254H, or concurrently. Interstellar medium, the milky way, galaxies, and the large-scale structure of the universe. Coordinate systems, instruments, and data analysis. QP: AST 229 QA: AST 230, AST 327

**301. Junior Research Seminar**

Spring. 1(1-0) A student may earn a maximum of 4 credits in all enrollments for this course. P: AST 202.

Preparation and presentation of a review paper on a current topic in astronomy or astrophysics. QP: AST 230, AST 327 QA: AST 399

**310. Directed Studies**

Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. P: AST 202. R: Approval of department. Individual study or project in astronomy or astrophysics under the direction of a faculty member. QP: AST 230 QA: AST 490

**401. Stars**

Fall. 3(3-0)  
P: AST 202, PHY 321 or concurrently. Physical processes that determine the structure and evolution of stars. Results of stellar evolution theory. Stellar atmospheres. Observations of stars. QP: AST 327, PHY 396 QA: AST 442

**402. Galaxies**

Spring. 3(3-0)  
P: AST 401, PHY 481. Contents and dynamics of the milky way. Mass and luminosity distributions of galaxies. Stellar populations. The interstellar medium. Evolution of galaxies. Active galactic nuclei. QP: PHY 427, PHY 447 QA: AST 462, AST 463

**410. Senior Thesis**

Fall, Spring. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course. R: Open only to seniors in Astrophysics. Design and execute an original experiment or computation. A written and oral report of the research is required. QA: AST 406

**800. Research Methods**

Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. P: AST 801. Apprenticeship in astrophysical research; student will work closely with individual faculty member learning research techniques. QA: PHY 800

**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.

**810. Radiation Astrophysics**

Spring of even-numbered years. 3(3-0)  
P: AST 801. Transfer of radiation through plasmas and processes for emission and absorption of photons. Interpretation of the spectra of stars, interstellar medium, and galaxies. QA: AST 442

**820. Advanced Topics in Astrophysics**

(MTC)  
Fall, Spring. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. P: AST 801. Advanced work in a specialized astrophysical topic. QA: AST 820

**830. Galactic and Extragalactic Dynamics**

Fall of even-numbered years. 3(3-0)  
P: AST 801, PHY 820. Implications of gravitational dynamics and stellar evolution on galactic and extragalactic systems.

**840. Stellar Astrophysics**

Spring of odd-numbered years. 3(3-0)  
P: AST 801. Physics of stellar interiors. Methods for calculating stellar models. Principles of stellar evolution. QA: AST 820

**860. Gravitational Astrophysics and Cosmology (MTC)**

Fall, Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. Topics in general relativity, gravitational astrophysics, and cosmology. QA: PHY 860, PHY 861

**870. Astronomical Instrumentation and Data Analysis**

Fall of odd-numbered years. 3(3-0)  
P: AST 801. Theory and techniques of astronomical data acquisition and analysis.

**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. QP: COM 115 QA: ASC 108

**203. Introduction to Communication Sciences and Disorders**

Fall, Spring. 3(3-0)  
R: Not open to students with credit in ASC 403. Survey of research and practice regarding speech, hearing and language disorders in children and adults. QA: ASC 201, ASC 470

**214. Anatomy and Physiology of the Speech and Hearing Mechanism**

Fall. 4(3-2)  
P: 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. QP: ASC 108 QA: ASC 274

**232. Descriptive Phonetics**

Fall. 2(1-2)  
Principles of speech production. Transcription of speech using the International Phonetic Alphabet. QP: ASC 274 QA: ASC 276

**255. Speech and Hearing Sciences**

Spring. 5(4-2)  
P: ASC 214, ASC 232 or concurrently, MTH 110 or MTH 116, one ISP course. R: Not open to freshmen. Application of the scientific method to the studies of audition, speech perception and speech production. QP: ASC 274, ASC 276 QA: ASC 277

**333. Oral Language Development**

Fall, Spring. 3(3-0)  
P: ASC 203 or one LIN course or one PSY course. R: Not open to freshmen. Development of receptive and expressive aspects of child language. QA: ASC 222

**344. Evaluation Procedures in Audiology**

Fall. 4(3-2)  
P: ASC 255. Classification of hearing disorders. Behavioral and electrophysiological measurement of hearing, including subjective and objective testing procedures. QP: ASC 276, ASC 277 QA: ASC 454

**364. Evaluation Procedures in Speech-Language Pathology**

Fall. 4(3-2)  
P: ASC 333. R: Open only to Audiology and Speech Sciences majors. Evaluation procedures in speech-language pathology, test procedures, evaluation of results, and report writing. QP: ASC 201, ASC 277 QA: ASC 373

**403. Communication Sciences and Disorders**

Fall. 3(3-0)  
R: Not open to freshmen and sophomores. Not open to Audiology and Speech Sciences majors. Not open to students with credit in ASC 203. Research and practice regarding communication disorders and the professions of speech-language pathology and audiology. QP: ASC 201 QA: ASC 470, ASC 201

**433. Language Dialect Differences in Applied Contexts**

Spring. 3(3-0)  
R: Not open to freshmen and sophomores. Regional, ethnic, and cultural characteristics of American English. Comparison of speech-language differences and disorders. QA: ASC 444

**443. Aural Rehabilitation**

Spring. 3(3-0)  
P: ASC 344. Fundamental aspects of auditory rehabilitation, including individual and group amplification systems, auditory training, speechreading, and counseling with children and adults. QP: ASC 454 QA: ASC 460

**463. Intervention Procedures in Speech-Language Pathology**

Spring. 3(3-0)  
P: ASC 364. R: Open only to Audiology and Speech Sciences majors. Intervention procedures for individuals with developmental and acquired communication disorders. QP: ASC 373 QA: ASC 476

**483. School-Based Communication Disorders Programs**

Spring. 3(3-0)  
P: ASC 463, ASC 494 or concurrently. R: Open only to Audiology and Speech Sciences majors. Administrative and regulatory aspects of school-based programs for persons with communication disorders. QP: ASC 201, ASC 373 QA: ASC 477

**490. 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 department, application required. Individualized student activities in human communication sciences and disorders. QA: ASC 499

- 494. Clinical Practicum in Communication Disorders**  
Fall, Spring, Summer. 1 credit. A student may earn a maximum of 2 credits in all enrollments for this course.  
P: ASC 463. R: Open only to Audiology and Speech Sciences majors. Approval of department. Supervised provision of clinical services to individuals with speech, language and/or hearing disorders.  
QP: ASC 201, ASC 373 QA: ASC 474
- 803. Research Methods in Communication Sciences and Disorders**  
Fall. 3(3-0)  
R: Open only to graduate students in Audiology and Speech Sciences.  
Hypothesis generation, experimental design, data collection, data analysis and presentation.
- 813. Neuroanatomy and Neurophysiology of Speech, Language, and Hearing**  
Fall. 3(3-0)  
R: Open only to graduate students in Audiology and Speech Sciences.  
Structural and functional descriptions of the nervous system as it relates to communication sciences and disorders.  
QA: ASC 876
- 823A. Acquired Language Disorders**  
Spring. 3(3-0)  
P: ASC 813 or concurrently. R: Open only to graduate students in Audiology and Speech Sciences.  
Neuropathology, symptomatology, and speech-language rehabilitation of individuals with aphasia and related disorders.  
QP: ASC 876 QA: ASC 841A
- 823B. Motor Speech Disorders**  
Fall. 3(3-0)  
P: ASC 813 or concurrently. R: Open only to graduate students in Audiology and Speech Sciences.  
Neuropathology, symptomatology, and speech-language habilitation and rehabilitation of individuals with motor speech disorders.  
QP: ASC 876 QA: ASC 841B
- 823C. Voice Disorders**  
Summer. 3(3-0)  
R: Open only to graduate students in Audiology and Speech Sciences.  
Etiology, symptomatology, diagnosis, and treatment of voice disorders in children and adults.  
QA: ASC 841C
- 823D. Fluency Disorders**  
Fall. 3(3-0)  
R: Open only to graduate students in Audiology and Speech Sciences.  
History, theories, symptomatology, diagnosis, and treatment of fluency disorders in children and adults.  
QA: ASC 841D
- 823E. Assessment of Childhood Language Disorders**  
Fall. 3(3-0)  
R: Open only to graduate students in Audiology and Speech Sciences.  
Evaluation of language disorders of preschool, school-aged, and adolescent populations.  
QA: ASC 841F
- 823F. Language Intervention: Early Stages**  
Spring. 3(3-0)  
P: ASC 823E or approval of department. R: Open only to graduate students in Audiology and Speech Sciences.  
Principles of intervention in language disorders for children functioning at or below preschool levels, regardless of chronological age.  
QP: ASC 841F QA: ASC 841G
- 823G. Language Intervention: Later Stages**  
Summer. 3(3-0)  
P: ASC 823E or approval of department. R: Open only to graduate students in Audiology and Speech Sciences.  
Principles of intervention in language disorders for school-age children and adolescents functioning above preschool levels.  
QP: ASC 841F QA: ASC 841H
- 823X. Augmentative Communication**  
Fall. 3(3-0)  
R: Open only to graduate students in Audiology and Speech Sciences.  
History and philosophy of augmentative communication. Assessment, system selection, and intervention considerations for aided and unaided systems. Topics include synthesized voice output and micro-processor-based systems.  
QA: ASC 842
- 833. Auditory Psychophysics**  
Spring. 3(3-0)  
P: ASC 803 or concurrently. R: Open only to graduate students in Audiology and Speech Sciences.  
Psychophysical theory and methods as applied to the study of hearing phenomena.  
QP: COM 405 QA: ASC 854
- 843A. Hearing Assessment**  
Fall. 3(3-0)  
R: Open only to graduate students in Audiology and Speech Sciences.  
Clinical evaluation of hearing. Pure tone and speech audiometry. Immittance testing.  
QA: ASC 833A, ASC 833B
- 843B. Differential Diagnostic Audiology**  
Spring. 3(3-0)  
P: ASC 843A. R: Open only to graduate students in Audiology and Speech Sciences.  
Tests of peripheral and central auditory function for differential diagnosis of hearing impairment.  
QP: ASC 833A QA: ASC 833B
- 843C. Hearing Amplification and Rehabilitation**  
Spring. 3(3-0)  
P: ASC 843A. R: Open only to graduate students in Audiology and Speech Sciences.  
Clinical management of the hearing impaired. Amplification and other forms of aural rehabilitation.  
QP: ASC 833A QA: ASC 833I, ASC 833G
- 843D. Electrophysiologic Assessment**  
Fall. 3(3-0)  
P: ASC 813 or concurrently. R: Open only to graduate students in Audiology and Speech Sciences.  
Theory and methods of electrophysiologic testing of the auditory and vestibular systems.  
QP: ASC 876 QA: ASC 833H, ASC 833J
- 843E. Special Populations in Audiology**  
Summer. 3(3-0)  
P: ASC 843C. R: Open only to graduate students in Audiology and Speech Sciences.  
Audiologic considerations and evaluative procedures for infant, pediatric, mentally-impaired, multiply-handicapped, and geriatric populations.  
QP: ASC 833A, ASC 833G, ASC 833I QA: ASC 833E, ASC 833F
- 843F. Hearing Conservation**  
Fall. 3(3-0)  
P: ASC 833, ASC 843A, or approval of department. R: Open only to graduate students in Audiology and Speech Sciences.  
Hearing conservation programs in occupational, educational, and community settings. The role of the audiologist.  
QP: ASC 854, ASC 833A QA: ASC 833C
- 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: Open only to M.A. students in Audiology and Speech Sciences. Approval of department.  
Individualized study under faculty direction.  
QA: ASC 990
- 894A. Clinical Practicum in Speech-Language Pathology**  
Fall, Spring, Summer. 1 credit. A student may earn a maximum of 6 credits in all enrollments for this course.  
R: Open only to graduate students in Audiology and Speech Sciences. Approval of department.  
Supervised clinical experience in the management of clients with speech-language disorders.  
QA: ASC 875A
- 894B. Clinical Practicum in Audiology**  
Fall, Spring, Summer. 1 credit. A student may earn a maximum of 6 credits in all enrollments for this course.  
R: Open only to graduate students in Audiology and Speech Sciences. Approval of department.  
Supervised clinical experience in the management of clients with hearing disorders.  
QA: ASC 875B
- 899. Master's Thesis Research**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course.  
R: Open only to graduate students in Audiology and Speech Sciences. Approval of department.  
QA: ASC 899
- 914A. Speech Production and Perception I**  
Fall of even-numbered years. 4(3-2)  
P: ASC 803 or concurrently. R: Open only to graduate students in Audiology and Speech Sciences.  
Classroom and laboratory study of issues regarding speech production and perception.  
QP: COM 405
- 914B. Speech Production and Perception II**  
Spring of even-numbered years. 4(3-2)  
P: ASC 914A. R: Open only to graduate students in Audiology and Speech Sciences.  
Further classroom and laboratory study of issues regarding speech production and perception.
- 990. Independent Study**  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 16 credits in all enrollments for this course.  
R: Open only to Ph.D. students. Approval of department.  
Individualized study under faculty direction.  
QA: ASC 990
- 991. Special Topics in Communication Sciences and Disorders**  
Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course.  
R: Open only to graduate students in Audiology and Speech Sciences.  
Topics vary.
- 992. Seminar in Communication Sciences and Disorders**  
Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 12 credits in all enrollments for this course.  
R: Open only to graduate students in Audiology and Speech Sciences.  
Topics vary.  
QA: ASC 940
- 994. Research Practicum in Communication Sciences and Disorders**  
Fall, Spring, Summer. 1 credit. A student may earn a maximum of 12 credits in all enrollments for this course.  
P: ASC 803 or concurrently. R: Approval of department.  
Individual research under faculty supervision.  
QP: COM 405
- 999. Doctoral Dissertation Research**  
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course.  
R: Open only to Ph.D. students in Audiology and Speech Sciences. Approval of department.  
QA: ASC 999