Applied Cognition and Neuroscience

**ACN 5314 (HCS 5314)** Computational Modeling Methods in Behavioral and Brain Sciences (3 semester credit hours) Computational Neuroscience, Cognitive Neural Modeling, Machine Learning, and Mathematical Psychology modeling methodologies are introduced through the use of computer-based simulation modeling experiments. Emphasizes creative applications of these research methodologies. Prerequisites: BBSC majors only and department consent required. (3-0) T

**ACN 6110 (HCS 6110)** Fundamentals of Functional Brain Imaging Lab (1 semester credit hour) This course covers applications of functional neuroimaging data collection and analysis methods focusing on methods of data collection, and experimental design, data analysis methods, and how they are related. Students work in the lab to develop proficiency with neuroimaging analysis software tools. Class meetings will consist of lectures, hands-on demonstrations, and work-through sessions with readily available data sets to learn the mechanics of basic fMRI data analysis. Corequisite: ACN 6310 or HCS 6310. Prerequisites: BBSC majors only and department consent required. (0-3) Y

**ACN 6160** Neurobiology (1 semester credit hour) A self-paced course providing the neurobiological foundation for the study of speech-language pathology. Pass/Fail only. This course is offered in an online format only. Prerequisites: COMD majors only and department consent required. (1-0) S

**ACN 6310 (HCS 6310)** Fundamentals of Functional Brain Imaging (3 semester credit hours) In-depth topics in brain imaging including neuroimaging detection systems (primarily MRI), experimental design, statistical techniques in image analysis, clinical applications of functional neuroimaging, and reviews of pertinent literature using functional brain imaging to illuminate various cognitive and perceptual processes, including language, memory, hearing, and vision. Corequisite: ACN 6110 or HCS 6110. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**ACN 6312 (HCS 6312 and PSYC 6312)** Research Methods in Behavioral and Brain Sciences - Part I (3 semester credit hours) This course focuses on applying, understanding, and interpreting various ANOVA-related statistical techniques in a behavioral science context. The course provides students with an understanding of the interrelationships among statistical techniques, and computer skills required for data analyses. Students without the necessary background knowledge of basic statistics and experimental design will be required to take PSY 3392 before registering for ACN 6312. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**ACN 6313 (HCS 6313 and PSYC 6313)** Research Methods in Behavioral and Brain Sciences - Part II (3 semester credit hours) This course focuses on applying, understanding, and interpreting regression and analysis of variance -related statistical techniques in a behavioral and brain science context. The course provides students with increased conceptual understanding of topics within regression and analysis of variance (e.g., hierarchical regression analysis, multiple regression with continuous and categorical predictors, regression diagnostics, fixed, random, and mixed effect models), along with computer skills required to interpret data analyses. Prerequisites: (ACN 6312 or HCS 6312 or PSYC 6312) and department consent required. (3-0) Y

**ACN 6316 (HCS 6316 and PSYC 6316)** Research Methods in Behavioral and Brain Sciences - Part III (3 semester credit hours) Applying, understanding, and interpreting various advanced multivariate statistical techniques in brain and behavioral science contexts. Includes principal component analyses, simple and multiple
correspondence analyses, partial least square methods, multi-table analyses, discriminant analyses, cluster analysis, and structural equation modeling. May be repeated for credit as topics vary (6 semester credit hours maximum). Prerequisite: BBSC majors only. (3-0) R

**ACN 6322 (HCS 6322)** Computational Modeling Methods for Language Understanding (3 semester credit hours) Probabilistic methods for modeling natural language understanding and the statistical analysis of language data. Use of the MATLAB and PERL computer languages for instantiating specific knowledge-based computational theories of natural language understanding with a focus on information retrieval and text mining methods. Emphasizes creative applications of these research methodologies. Prerequisites: BBSC majors only and department consent required. (3-0) R

**ACN 6330 (HCS 6330) and PSYC 6330** Cognitive Science (3 semester credit hours) Cognitive, computational, and neural processing approaches to understanding perception, memory, thought, language, and emotion. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**ACN 6331 (HCS 6331) and PSYC 6331** Cognitive Development (3 semester credit hours) Survey of cognitive development theories and research in a variety of domains including perception, memory, language, and problem solving. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**ACN 6332 (HCS 6332) and PSYC 6332** Perception (3 semester credit hours) Psychophysical, neurophysiological, and computational foundations of sensation and perception. Basic senses of vision, audition, chemoreception, and tactile processing, with emphasis on understanding the processes that take us from neurons to perception and action. (3-0) R

**ACN 6333 (HCS 6333) and PSYC 6333** Memory (3 semester credit hours) Research and theory on the acquisition, representation, and retrieval of information by the mind/brain. Includes information processing and neuropsychological perspectives. Prerequisites: BBSC majors only and department consent required. (3-0) R

**ACN 6334 (HCS 6334)** Attention (3 semester credit hours) Theory and evidence on the study of attention especially in human vision and audition. Includes perceptual learning, information processing, and neuropsychological approaches. (3-0) R

**ACN 6337** Cognitive Ethnography (3 semester credit hours) Students in this course will learn to observe, document, and analyze cognitive processes in real-world settings using the methods of cognitive ethnography. The course provides students with an understanding of the embodied, situated, and distributed cognition and the interaction of cognition and culture that forms the foundation of cognitive ethnography methodology. The course may emphasize the uses of cognitive ethnography in human-computer interaction, system design, laboratory studies, cultural psychology, or media effects. Department consent required. (3-0) R

**ACN 6338 (HCS 6338) and PSYC 6338** Functional Neuroanatomy (3 semester credit hours) An introduction to human neuroanatomy organized by major brain system. Function of the neuroanatomy of each major system and relation to neurological disorders associated with damage to the neuroanatomy of the system. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**ACN 6340 (HCS 6340)** Cellular Neuroscience (3 semester credit hours) Basic neural biology and physiology and principles of synaptic transmission. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**ACN 6341** Human Computer Interactions I (3 semester credit hours) Methods and principles of human-computer interaction (HCI), user-centered design (UCD), and use ability evaluation. Provides broad overview of HCI and how HCI informs UCD processes throughout product development life cycle. Department consent required. (3-0) Y
ACN 6342 Human Computer Interactions II (3 semester credit hours) Detailed exploration of human-computer interaction (HCI) through readings in journal articles and research reports. Practical experience in methodology typically used in the design of usable systems. Department consent required. (3-0) Y

ACN 6346 (HCS 6346) and PSYC 6346) Systems Neuroscience (3 semester credit hours) Integrative systems level study of the nervous system. Aspects of neural mechanisms and circuitry underlying regulation of motor behaviors, sensory and perceptual processing, biological homeostasis, and higher cognitive functions. Prerequisites: BBSC majors only and department consent required. (3-0) Y

ACN 6348 (HCS 6348) Neural Net Mathematics (3 semester credit hours) Introduction to a large class of statistical machine learning algorithms including unsupervised, supervised, and reinforcement learning machines. Vector calculus and vector calculus-based probability theory with machine learning and artificial neural network modeling applications. Stochastic sequences of mixed random vectors, Bayesian Networks, and Markov random fields. Emphasizes applications of the theory to unsupervised, supervised, and reinforcement learning machines and artificial neural network modeling. Prerequisites: (Linear algebra and multivariable calculus and STAT 3341 or equivalent) and BBSC majors only and department consent required. (3-0) T

ACN 6349 (HCS 6349) Statistical Machine Learning for Artificial Neural Nets (3 semester credit hours) Mathematical tools for investigating the asymptotic behavior of both batch and adaptive machine learning algorithms including the Invariant Set Theorem, Zoutendijk-Wolfe convergence theorem, adaptive stochastic approximation methods, and Monte Carlo Markov Chain methods. M-estimation and bootstrap asymptotic statistical theory for characterizing asymptotic behavior of parameter estimates as a function of sample size to support: model selection, specification analysis, and hypothesis testing. Emphasizes applications of the theory to unsupervised, supervised, and reinforcement learning machines and artificial neural network modeling. Prerequisites: (ACN 6348 or HCS 6348) and BBSC majors only and department consent required. (3-0) T

ACN 6363 (HCS 6363) Text Comprehension Seminar (3 semester credit hours) Current readings in the field of text comprehension and memory. May be repeated for credit as topics vary (6 semester credit hours maximum). Prerequisites: BBSC majors only and instructor consent required. (3-0) R

ACN 6367 (HCS 6367) and PSYC 6367) Speech Perception (3 semester credit hours) Current topics and theories in speech perception. Topics include the acoustic correlates of speech sounds and the problem of invariance, the perception of speech under adverse conditions, the effects of hearing impairment, and models of speech perception. Prerequisites: BBSC majors only and department consent required. (3-0) R

ACN 6368 (HCS 6368) and PSYC 6368) Language Development (3 semester credit hours) Advanced study of normal oral language development. The goals of this course are to consider the developmental trajectories of the different components of language; to consider the varied and critical roles of language in human development; to understand the impact of culture, different languages, child factors and the environment on development; and to be introduced to the theoretical perspectives driving research and thinking in this area of inquiry. Prerequisite: BBSC majors only. (3-0) Y

ACN 6372 (HCS 6372) The Neuroscience of Pain (3 semester credit hours) A systems-oriented course covering the anatomical and physiologic basis of pain. The course describes the basic features of neural processing of pain signals in the spinal cord and brain, the anatomy and the function of the descending systems that can control transmission of pain signals, and peripheral and central sensitization. The physiological and molecular basis for treatment of pain is discussed. Prerequisites: BBSC majors only and department consent required. (3-0) Y
**ACN 6373 (HCS 6373)** Intraoperative Neurophysiological Monitoring (IONM) Part I (3 semester credit hours)
Part 1 of the course covers the anatomical and physiological basis for the use of electrophysiological techniques in the surgical operating room and clinically in diagnosis of disorders affecting the nervous system. Prerequisite: BBSC majors only. (3-0) Y

**ACN 6374 (HCS 6374)** Intraoperative Neurophysiological Monitoring (IONM) Part II (3 semester credit hours)
Part II covers the use of recordings of neuro-electric brain potentials and their interpretation during surgical operations and clinically for diagnostic purposes. The use of electrophysiological methods for guiding implantation of stimulating electrodes deep in the brain and for assisting the surgeon in certain operations are also described. Prerequisite: **ACN 6373** or **HCS 6373**. (3-0) Y

**ACN 6388 (HCS 6388)** MATLAB for Brain Sciences (3 semester credit hours) Introduction to MATLAB computer programming. Covers the use of the MATLAB programming language for the purpose of stimulus generation, behavioral data analysis, statistical analyses, and generation of publication quality figures. Prerequisites: BBSC majors only and department consent required. (3-0) R

**ACN 6389 (HCS 6389)** Speech Perception Laboratory (3 semester credit hours) Introduction to the field of speech processing by computer, with primary application to research techniques in the study of speech perception. Prerequisites: BBSC majors only and department consent required. (0-9) T

**ACN 6395 (HCS 6395 and PSYC 6395)** Cognitive Psychology (3 semester credit hours) Theory and research on perception, learning, thinking, psycholinguistics, and memory. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**ACN 6V71** Industry Internship (1-6 semester credit hours) Pass/Fail only. May be repeated for credit (12 semester credit hours maximum). Prerequisites: BBSC majors only and department consent required. ([1-6]-0) S

**ACN 6V72** Research Internship (1-6 semester credit hours) Pass/Fail only. May be repeated for credit (12 semester credit hours maximum). Prerequisites: BBSC majors only and instructor consent required. ([1-6]-0) S

**ACN 6V81** Special Topics in Applied Cognition and Neuroscience (1-9 semester credit hours) May be repeated for credit as topics vary (12 semester credit hours maximum). Prerequisites: BBSC majors only and department consent required. ([1-9]-0) Y

**ACN 7310 (HCS 7310)** Advanced Research Methods (3 semester credit hours) Advanced methods of inquiry and analysis unique to cognition and neuroscience, communication sciences and disorders, or psychological sciences. May be repeated for credit as topics vary (12 semester credit hours maximum). Prerequisites: **HCS 6313** and department consent required. (3-0) Y

**ACN 7320 (HCS 7320)** Topics in Multivariate Data Analysis using R (3 semester credit hours) R programming language (including writing functions and using special packages). Using the R programming language to analyze standard designs used in Behavioral and Brain Science. Includes designing publication ready graphics and analysis of experimental data and surveys. May be repeated for credit as topics vary (9 semester credit hours maximum). Prerequisite: **ACN 6313** or **HCS 6313** or **PSYC 6313** or instructor consent required. Corequisite: **ACN 7321**. (3-0) Y

**ACN 7321 (HCS 7321)** Topics in Multivariate Data Analysis Theory (3 semester credit hours) Principal component analysis, correspondence analysis, multidimensional scaling, discriminant analysis, partial least square methods, multi-table analysis, cluster analysis, and various other statistical techniques. Includes discussion of computationally intensive cross-validation inference methods such as jackknife and bootstrap. May be repeated for credit as topics vary (9 semester credit hours maximum). Prerequisite: **ACN 6313** or **HCS 6**
or instructor consent required. Corequisite: PSYC 6313. (3-0) Y

ACN 7324 (AUD 7324 and COMD 7324) Seminar in Cochlear Implants and Technology for Persons with Hearing Impairments (3 semester credit hours) This course provides an overview of prosthetic alternatives to conventional amplification for individuals with significant hearing loss. Topics include candidacy determination, technology, basics of device programming and troubleshooting, awareness of controversial areas related to cochlear implantation, and future trends in cochlear implantation. Further, this course will cover current issues in the medical, audiological, speech/language, quality of life, and educational management of children and adults with cochlear implants. Prerequisites: BBSC majors only and department consent required. (3-0) Y

ACN 7330 (HCS 7330) Advanced Functional Brain Imaging (3 semester credit hours) This course explores more in-depth topics such as neuroimaging detection systems, clinical applications of functional neuroimaging, experimental design, statistical techniques in image analysis and reviews of pertinent literature using functional brain imaging to illuminate various cognitive and perceptual processes, such as language, memory, hearing and vision. Prerequisites: BBSC majors only and department consent required. (3-0) Y

ACN 7338 (HCS 7338) Brain Connectivity (3 semester credit hours) Systems and cognitive neuroscience based approach towards measuring and understanding patterns of brain connectivity in humans and non-human animals. Prerequisites: (HCS 6346 or HCS 6338) and instructor consent required. (3-0) Y

ACN 7343 (HCS 7343) Neuropharmacology (3 semester credit hours) Biology of neurotransmission in the central nervous system. Includes ionotropic and metabotropic coupling of all known classes of receptors to both their cellular and systemic effects. Clinical efficacy, side effects, and other issues related to drug use and abuse are covered. Prerequisites: (ACN 6340 or HCS 6340 or ACN 6346 or HCS 6346 or PSYC 6346) and department consent required. (3-0) Y

ACN 7372 (HCS 7372) Seminar in Neuroscience (3 semester credit hours) Selected topics and current research in neuroscience. May be repeated for credit as topics vary (12 semester credit hours maximum). Prerequisite: BBSC majors only. (3-0) Y

Audiology

AUD 6113 Grand Rounds (1 semester credit hour) Case staffing, presentations and discussion of patient audiological diagnostic and rehabilitation and selected topics in a group session attended by students and faculty. Pass/Fail only. May be repeated for credit (6 semester credit hours maximum). Prerequisites: BBSC majors only and department consent required. (1-0) Y

AUD 6114 Instrumentation (1 semester credit hour) This course focuses on the use, care, and maintenance of new generation audiological and vestibular diagnostic equipment. Laboratory exercises emphasize use and interpretation of equipment to explore seldom used equipment features. Prerequisites: BBSC majors only and department consent required. (1-0) Y

AUD 6216 Audiologic Rehabilitation for Adults (2 semester credit hours) Evaluation and remediation of impairment, limitations, and restrictions associated with hearing loss. Emphasis on counseling, assistive technology, coping skills, communication strategies, auditory training, advocacy for adults with hearing loss, and community resources. Prerequisites: BBSC majors only and department consent required. (2-0) Y

AUD 6303 Hearing Science (3 semester credit hours) Introduction to the physics of sound, theories of auditory sensation, and perception. Prerequisites: BBSC majors only and department consent required. (3-0) Y
**AUD 6305** Anatomy and Physiology of Audition (3 semester credit hours) Structure and function of the auditory system including external, middle, and inner ear, and central auditory mechanisms. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**AUD 6306** Speech Science (3 semester credit hours) The physical properties of speech and the perceptual, cognitive and neural processes that intervene between the production and perception of speech in everyday speech communication. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**AUD 6310** Advanced Clinical Audiology (3 semester credit hours) Instrumentation and calibration standards for audiological practice. The development, application and interpretation of standard and advanced diagnostic audiological procedures. Prerequisites: BBSC majors only and department consent required. Corequisite: **AUD 6v20**. (3-0) Y

**AUD 6311** Diagnostic Audiology (3 semester credit hours) Procedures for audiological diagnosis including behavioral and objective measures. Emphasis on administration, interpretation, and appropriate reporting of diagnostic audiological tests. Prerequisites: BBSC majors only and department consent required. Corequisite: **AUD 6v20**. (3-0) Y

**AUD 6318** Pediatric Audiology (3 semester credit hours) Etiological, medical, developmental, and genetic considerations relevant to the pediatric population. Emphasis on current diagnostic options, interpretation, and appropriate reporting of results from infants, young, and older children, including those having developmental delays from cognitive deficits or physical disabilities. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**AUD 6352** Medical Audiology (3 semester credit hours) Etiology and pathology of auditory/vestibular disorders and diagnostic and treatment procedures. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**AUD 6v20** Laboratory Procedures in Audiology and Hearing Science (1-9 semester credit hours) Application in structured laboratories of principles taught in diagnostic audiology, rehabilitation audiology, hearing science, amplification, cochlear implant, vestibular and electrophysiology courses. May be repeated for credit. Prerequisites: BBSC majors only and department consent required. Corequisite: **AUD 6310** or **AUD 6311** or **AUD 6v20** or **AUD 7324** or **AUD 7327** or **AUD 7253** or **AUD 7351**. (0-[1-9]) S

**AUD 7205** Auditory Pharmacology (2 semester credit hours) Ototoxicity and otoprotection. Focuses on adverse auditory or vestibular side effects of common pharmaceuticals; pharmacotherapeutic benefits of drugs used to treat hearing loss, tinnitus, or balance disorders; and potential protection of auditory function via investigational drug agents. Prerequisites: BBSC majors only and department consent required. (2-0) Y

**AUD 7220** Tinnitus (2 semester credit hours) The goal of this course is to introduce students to the history, assessment, treatment, and multidisciplinary management of tinnitus, a phantom auditory perception. The primary focus is the relationship between tinnitus and hearing loss as well as other auditory phenomena including abnormal loudness tolerance. Prerequisites: BBSC majors only and department consent required. (2-0) Y

**AUD 7228** Hearing Loss Prevention (2 semester credit hours) Identification and prevention of hearing loss in children and adults. Focuses on industrial hearing conservation programs. Includes hearing loss prevention in children, hearing protection, and noise standards. Prerequisites: BBSC majors only and department consent required. (2-0) Y

**AUD 7240** Auditory Processing Disorders and other Advanced Topics in Audiology (2 semester credit hours)
Lectures taught by different faculty members. Examples are: auditory processing disorders, vestibular case studies, implantable hearing devices, wireless technology, coding and reimbursement, and unilateral hearing loss. Prerequisite: BBSC majors only. (2-0) Y

**AUD 7253** Clinical Electrophysiology (2 semester credit hours) Evoked and event-related potentials including recording techniques, neurophysiological mechanisms, and applications to clinical populations. Prerequisites: BBSC majors only and department consent required. Corequisite: **AUD 6V20**. (2-0) Y

**AUD 7280** Doctoral Practicum in Audiology (2 semester credit hours) Supervised doctoral level experience in assessment and habilitation/rehabilitation of hearing impairment across the lifespan and scope of practice in audiology. Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. (2-0) S

**AUD 7282** Issues in Mentoring and Counseling (2 semester credit hours) This course focuses on topics in patient counseling and professional mentoring. Counselors and mentors across various disciplines will discuss the importance of effective communication and conflict resolution as it relates to key issues in dynamics between practitioners and patients, family members, and in the workplace. Prerequisites: BBSC majors only and department consent required. (2-0) Y

**AUD 7310** Professional Issues in Audiology (3 semester credit hours) Ethics and professional issues in various practice settings, including multicultural considerations, licensure, certification, outcome measures, liability, malpractice, and practice management. Department consent required. Prerequisite: BBSC majors only. (3-0) Y

**AUD 7321** Theories of Amplification (3 semester credit hours) The effect of sensory hearing loss on sound awareness and speech perception. Development of hearing aid signal processing, rationale for amplification and verification of hearing aid performance. Prerequisites: BBSC majors only and department consent required. Corequisite: **AUD 6V20**. (3-0) Y

**AUD 7324** (ACN 7324 and COMD 7324) Seminar in Cochlear Implants and Technology for Persons with Hearing Impairments (3 semester credit hours) This course provides an overview of prosthetic alternatives to conventional amplification for individuals with significant hearing loss. Topics include candidacy determination, technology, basics of device programming and troubleshooting, awareness of controversial areas related to cochlear implantation, and future trends in cochlear implantation. Further, this course will cover current issues in the medical, audiological, speech/language, quality of life, and educational management of children and adults with cochlear implants. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**AUD 7325** Intensive Auditory Rehabilitation for Adult Hearing Loss (3 semester credit hours) Intensive experience with comprehensive rehabilitation of adults and/or teens with a focus on research and clinical techniques to facilitate communication in employment, social, and home situations through the use of communication strategies and advanced assistive technology. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**AUD 7326** Aural Habilitation of Children with Hearing Impairments (3 semester credit hours) Issues in selection and fitting of amplification and FM systems for children, rationale and methods of auditory training, optimizing the auditory environment, communication options, and family-centered intervention. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**AUD 7327** Evaluation and Fitting of Amplification Systems (3 semester credit hours) Advanced study of digital technology in amplification systems including compression, noise reduction, signal-to-noise ratio enhancement, feedback suppression, frequency lowering technology and speech enhancement strategies. Verification of advanced features in hearing aid delivery. Examination of new developments in hearing aid technologies.
Prerequisites: BBSC majors only and department consent required. Corequisite: **AUD 6V20.** (3-0) Y

**AUD 7338** Research in Audiology (3 semester credit hours) Review of the principles of research, including the relationship between working hypotheses and methodology and outcomes to prepare individuals to become a critical consumer of research. Scientific writing process including journal publication, scientific posters, and writing style. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**AUD 7351** Physiologic Assessment of Vestibular System (3 semester credit hours) Anatomy, physiology and pathophysiology of the vestibular, oculomotor and related systems used for maintaining equilibrium and balance. Disorders affecting balance. Procedures used for diagnostic assessment of the vestibular system including Electronystagmography/Videonystagmography, Video Head Impulse Test, rotational chair, platform posturography and vestibular evoked myogenic potentials. Medical and non-medical treatments for balance disorders. Prerequisites: BBSC majors only and department consent required. Corequisite: **AUD 6V20.** (3-0) Y

**AUD 7360** Planning Audiology Services in Developing Countries (3 semester credit hours) This course is created with a required on-site practicum in under-served and developing country as well as providing a structured didactic experience for students. Students will get a first hand overview of the specific challenges involved in providing hearing health care services in developing countries in the context of the country and culture. Students will be supervised and demonstrate required clinical knowledge and skill to interact with patients and professionals during the experience as well as those outlined in Clinical Standards and Implementation Guidelines. May be repeated for credit (6 semester credit hours maximum). Instructor Consent Required. (3-0) Y

**AUD 7V73** Seminar in Audiology and Hearing Science (1-6 semester credit hours) Current topics in audiology and hearing science. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. ([1-6]-0) T

**AUD 7V82** Special Topics in Hearing Science and Audiology (1-9 semester credit hours) Selected topics and current research in hearing science and audiology. Pass/Fail only. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. ([1-9]-0) Y

**AUD 7V91** Methods in Audiology and Hearing Science (1-6 semester credit hours) Issues related to methods of assessment and intervention in audiology and hearing science. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. ([1-6]-0) Y

**AUD 7V98** Directed Study in Audiology and Hearing Science (1-9 semester credit hours) Individualized program of study which may include reading, research implementation of clinical strategies, and/or other designated activities. Pass/Fail only. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**AUD 8V80** Individual Research in Audiology (1-9 semester credit hours) Independent research project to fulfill the Doctor of Audiology research requirement. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**AUD 8V97** Doctoral Internship in Audiology (1-9 semester credit hours) Intensive, full-time, clinical audiology practicum in a work setting that provides exposure to a diverse clinical population and a wide breadth of audiologic services. Completed during the fourth year of the AuD Program. Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S
Communication Disorders

**COMD 5340** Articulation Disorders (3 semester credit hours) Etiology, symptomatology, evaluation, and treatment of articulation disorders. Prerequisite: BBSC majors only. (3-0) Y

**COMD 5341** Audiology (3 semester credit hours) Introduction to the profession of audiology. Topics include basic pure-tone and speech audiometry; basic masking principles; cerumen management and infection control; overview of hearing and balance disorders, evaluation, and treatment; clinical application and interpretation in audiology. This course is offered in an online format only. Prerequisites: BBSC majors only and department consent required. (3-0) S

**COMD 5344** Anatomy and Physiology of Speech and Hearing (3 semester credit hours) Study of anatomic and physiologic mechanisms underlying speech and swallowing: respiration, phonation, and articulation; overview of the peripheral auditory system. Detailed overview of the nervous system. Prerequisite: BBSC majors only. (3-0) S

**COMD 6101** Childhood Apraxia of Speech (1 semester credit hour) Current research topics in the assessment and management of children of all ages with childhood apraxia of speech. Includes recent developments in prosody, oral motor therapy, profiling characteristics, articulatory error consistency, augmentative communication, integral stimulation intervention, and diagnostic criteria. Pass/Fail only. This course is offered in an online format only. Prerequisites: COMD 6320 and department consent required. (1-0) S

**COMD 6102** Dysphagia in Public Schools (1 semester credit hour) Current research topics in dysphagia assessment and management of children of all ages in the public school setting. Includes program development, legislative information, treatment plans in the IEP, and ethical considerations. Pass/Fail only. This course is offered in an online format only. Prerequisites: COMD 7303 and department consent required. (1-0) S

**COMD 6103** Research in Pediatric TBI (1 semester credit hour) Current research topics in the assessment and management of children of all ages with traumatic brain injury (TBI). Includes clinical characteristics of acute dysphagia in children with TBI, recovery of memory function, articulatory function, executive function, and inference comprehension skills in children with TBI. Pass/Fail only. This course is offered in an online format only. Prerequisites: COMD 6377 and COMD 6308 and department consent required. (1-0) S

**COMD 6105** Professional Writing (1 semester credit hour) Professional reports, and professional writing covering behavioral objectives, discharge planning, and report formats. Pass/Fail only. This course is offered in an online format only. Prerequisites: BBSC majors only and department consent required. (1-0) S

**COMD 6106** Medical SLP (1 semester credit hour) Medical terminology and scope of practice of the medical SLP. Topics include assessment of aphasia, cognitive rehabilitation after TBI, diagnostic approaches to dementia, communication impairment and management of dementia, assessment and management of dysphagia, voice disorders, head and neck cancer, psychogenic communication disorders, issues in geriatric medicine and drug induced communication and swallowing disorders. Pass/Fail only. This course is offered in an online format only. Prerequisites: BBSC majors only and department consent required. (1-0) S

**COMD 6107** Dementia (1 semester credit hour) Diagnosis, treatment, and current best practice in the management of the dementias. Pass/Fail only. This course is offered in an online format only. Prerequisites: COMD 6377 and department consent required. (1-0) S

**COMD 6108** Pulmonary Issues (1 semester credit hour) Issues related to respiration and swallowing
coordination in normal aging and patients with specific respiratory conditions (i.e., aspiration pneumonia, COPD, Parkinsonism, patients on mechanical ventilation). Normal and disordered respiratory systems, and assessment/management considerations for patients with specific respiratory issues are discussed. Pass/Fail only. This course is offered in an online format only. Prerequisites: COMD 7303 and department consent required. (1-0) S

**COMD 6109** Tracheostomy and Mechanical Ventilation (1 semester credit hour) Communication, respiration and swallowing issues/considerations as they relate to patients who require tracheostomy tubes and/or ventilators. Normal and disordered respiratory systems, oral and nonoral communication and assessment/management of dysphagia. Pass/Fail only. This course is offered in an online format only. Prerequisites: COMD 7303 and department consent required. (1-0) S

**COMD 6110** Pediatric Feeding (1 semester credit hour) Assessment and management of infants and children of all ages with feeding and swallowing impairments. Includes recent developments in the field of swallowing disorders including advances in technology, surgery and pharmacology, and management of pediatric patients with dysphagia. Pass/Fail only. This course is offered in an online format only. Prerequisites: COMD 7303 and department consent required. (1-0) S

**COMD 6111** Articulation and Phonological Disorders (1 semester credit hour) Review of methods in articulation disorders. Required for students with undergraduate majors in speech language pathology who did not complete an undergraduate articulation course. If you have previously taken COMD 5340 or SPAU 3340 at UT Dallas you are not eligible for this module. This course is offered in an online format only. Department consent required. (1-0) S

**COMD 6112** Counseling in Communication Disorders (1 semester credit hour) Counseling and interviewing skills across clinical populations in communication disorders. Pass/Fail only. This course is offered in an online format only. Prerequisites: BBSC majors only and department consent required. (1-0) S

**COMD 6113** Bilingual Speech Assessment and Treatment (1 semester credit hour) This course will review developmental norms for phonology and articulation and considerations in assessment and treatment including dialectical differences, transfer, and cross-linguistic effects. Emphasis will be on Spanish-English bilinguals although general bilingual practice considerations will be discussed. Pass/Fail only. This course is offered in an online format only. Prerequisites: BBSC majors only and department consent required. (1-0) S

**COMD 6221** Voice Disorders (2 semester credit hours) Etiology of voice disorders and methods for assessing and modifying vocal behavior. Prerequisites: BBSC majors only and department consent required. (2-0) Y

**COMD 6222** Stuttering (2 semester credit hours) Principles, methods, and procedures for assessment, and intervention of stuttering and associated disorders. Prerequisites: BBSC majors only and department consent required. (2-0) Y

**COMD 6240** Professional Issues in Speech/Language Pathology (2 semester credit hours) Insights into the real-world and a means to master objectives as a professional in the field of speech-language pathology. Prerequisites: BBSC majors enrolled in their final semester and department consent required. (2-0) Y

**COMD 6305** Speech Science (3 semester credit hours) Anatomy, physiology and functional organization of speech. Mechanisms of normal speech production and perception with applications to the clinical setting. Pass/Fail only. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**COMD 6307** Language Acquisition (3 semester credit hours) Development of the phonological, morpho-syntactic, semantic, and pragmatic aspects of language, and consideration of the social, psychological, and cultural influences. Prerequisites: BBSC majors only and department consent required. (3-0) S
COMD 6308 Assessment and Intervention of Language Impairments in Preschool and School-Age Children (3 semester credit hours) Assessment and intervention for children with diverse language impairments. Theoretical models, characteristics and correlates of pediatric language disorders; evidence-based approaches to screening, diagnosis, assessment, treatment, and prevention. Prerequisites: BBSC majors only and department consent required. (3-0) Y

COMD 6320 Motor Speech Disorders (3 semester credit hours) Anatomic and physiologic bases of the motor speech mechanism. Etiology, symptomatology, evaluation and treatment techniques for a variety of motor speech disorders in children and adults. Prerequisites: BBSC majors only and department consent required. (3-0) S

COMD 6330 Practicum in Communication Sciences (3 semester credit hours) Supervised, practice-based activities in applied contexts or evaluation and therapeutic management of communication disorders. Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. (3-0) S

COMD 6377 Neurogenic Communication Disorders I (3 semester credit hours) Introduction to adult neurogenic communication disorders including neuropathology, assessment and diagnosis of aphasia, traumatic brain injury, right hemispheric impairment, and dementia. Prerequisites: BBSC majors only and department consent required. (3-0) S

COMD 6378 Neurogenic Communication Disorders II (3 semester credit hours) Language and cognitive intervention for individuals with adult neurogenic communication disorders with management of special populations including stroke, traumatic brain injury, and dementia. Prerequisites: BBSC majors only and department consent required. (3-0) S

COMD 6379 (HCS 6379) Neurological Basis of Language Development (3 semester credit hours) Study of the development of the pre- and postnatal brain and how it relates to the acquisition and development of language throughout the lifespan. Prerequisites: BBSC majors only and department consent required. (3-0) R

COMD 6630 Internship in Communication Disorders (6 semester credit hours) Intensive internship program in a clinical setting. Pass/Fail only. Prerequisites: BBSC majors only and instructor consent required. (6-0) S

COMD 6V09 Autism Spectrum Disorder (1-6 semester credit hours) Issues concerning the diagnosis and theories of autism. The development of social, communication language, and cognitive skills in autism, as well as various therapeutic approaches. Prerequisites: BBSC majors only and department consent required. ([1-6]-0) Y

COMD 6V98 Thesis (3-6 semester credit hours) Pass/Fail only. May be repeated for credit (6 semester credit hours maximum). Prerequisites: BBSC majors only and department consent required. ([3-6]-0) S

COMD 7172 Laryngectomy (1 semester credit hour) Laryngectomy process from surgery to rehabilitation, laryngeal devices and how to use them. TEP, stoma, and trach care, and strategies to help patients master esophageal speech. Pass/Fail only. Prerequisites: BBSC majors only and department consent required. (1-0) Y

COMD 7204 Craniofacial Disorders (2 semester credit hours) Etiology, symptomatology, evaluation, and treatment of communication disorders found within the population with a craniofacial difference emphasizing cleft lip and palate and Velo-Cardio-Facial Syndrome. Prerequisites: BBSC majors only and department consent required. (2-0) Y

COMD 7207 Advanced Topics in Adult Dysphagia (2 semester credit hours) Integration and application of dysphagia evaluation and treatment at an advanced level. Management of special populations including stroke, traumatic brain injury, and oral/laryngeal cancers. Family and patient counseling/education. Ethical issues and decision-making. Prerequisites: COMD 7303 and department consent required. (2-0) Y
**COMD 7208** Pediatric Dysphagia (2 semester credit hours) Evaluation and treatment of feeding and swallowing disorders in infants and children within various clinical settings. Normal and abnormal anatomy, common causes of pediatric dysphagia, clinical and instrumental assessment, evidence-based interventions, and pertinent research will be included. Prerequisites: **COMD 7303** and department consent required. (2-0) Y

**COMD 7219** Birth-To-Three (2 semester credit hours) Typical and atypical development patterns and assessment and treatment approaches of infants and toddlers with a variety of speech, language, and feeding disorders. Prerequisites: **COMD 6308** and BBSC majors only and Department Consent required. (2-0) Y

**COMD 7221** Preschool Intervention (2 semester credit hours) The purpose of this class is to develop the skills to select and use appropriate assessment methods for preschoolers in the areas of language and articulation/phonological process delays/disorders, to develop appropriate treatment plans and intervention procedures for this population based on assessment results, and to determine when it is appropriate to end services. Skills such as varied treatment and scaffolding approaches (including the use of visually supported learning strategies and low-tech AAC), appropriate programming options (group and individual therapy models, etc.), behavior management, interdisciplinary collaboration, considerations involving parents and ethics, and data collection will be emphasized in discussion. Prerequisite: **COMD 6308** and department consent required. (2-0) Y

**COMD 7222** Therapy Strategies for School-Age Children (2 semester credit hours) Practical applications and intervention approaches will be explored for children in elementary, middle, and high school. The course will provide strategies for language-based learning disabilities and other diagnoses that require intervention. Prerequisites: **COMD 6308** and department consent required. (2-0) Y

**COMD 7301** Public School Methods (3 semester credit hours) Practices and procedures of implementing clinical skills in the public schools including applying federal and state laws to best practices in assessment and intervention. Prerequisites: BBSC majors only and department consent required. (3-0) S

**COMD 7302** Seminar in Aphasiology (3 semester credit hours) Current issues in neurolinguistics. Models of brain and language; classification, symptoms, and etiology of aphasia. Analysis of aphasic language with respect to phonology, morphology, syntax, and semantics. Department consent required. (3-0) Y

**COMD 7303** Dysphagia (3 semester credit hours) Anatomic and physiologic bases of normal swallowing. Etiology, symptomatology, evaluation and treatment techniques for swallowing disorders in children and adults. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**COMD 7304** Seminar in Bilingual Speech-Language Pathology: Practice and Research (3 semester credit hours) Hands-on development of assessment and intervention with bilingual populations as guided by clinical research evidence. Focus on dissecting and implementing cutting-edge clinical tools (formal and informal) with bilingual speakers. May be repeated for credit (6 semester credit hours maximum). Recommended prerequisite: **COMD 7 V56**. Department consent required. (3-0) Y

**COMD 7305** Communication and the Aging Brain (3 semester credit hours) Social and biological factors affecting language and communication in normal aging. Pathological changes in aphasia and dementia. Assessment and intervention strategies. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**COMD 7306** Cultural Issues in Communication (3 semester credit hours) The multicultural nature of society, the role of language and communication in cultural identity, and how practice in the field of communicative disorders is tailored to cultural and linguistic diversity. Prerequisites: BBSC majors only and department consent required. (3-0) Y
COMD 7308 Preliteracy Development (3 semester credit hours) Historical, cultural, theoretical, developmental, and pedagogical perspectives on the foundation for literacy in early childhood. Prerequisites: BBSC majors only and department consent required. (3-0) T

COMD 7309 (HCS 7309) Neural Correlates of Human Cognition: Lesion-Deficit Models (3 semester credit hours) Correlation of brain lesions with cognitive deficits provides a human brain map of the essential anatomy underlying specific cognitive functions. The areas of cognition to be covered using this model include language, episodic memory, semantic memory, working memory, aspects of visuospatial functions, and higher-order motor planning. This knowledge base provides a key framework to combine with the findings of functional neuroimaging (fMRI, PET) in understanding how humans think. Cognitive deficits in patients (e.g., amnesia, aphasia, etc.) will be explained within this framework. Prerequisites: BBSC majors only and department consent required. (3-0) Y

COMD 7323 Auditory-Verbal Methods (3 semester credit hours) Comprehensive survey of the auditory-verbal approach to the habilitation of children with hearing losses to develop spoken language through listening for children of all ages; includes philosophy, research, special problems, auditory habilitation for older children, and specific methodology. Prerequisites: BBSC majors only and department consent required. (3-0) Y

COMD 7324 (ACN 7324 and AUD 7324) Seminar in Cochlear Implants and Technology for Persons with Hearing Impairments (3 semester credit hours) This course provides an overview of prosthetic alternatives to conventional amplification for individuals with significant hearing loss. Topics include candidacy determination, technology, basics of device programming and troubleshooting, awareness of controversial areas related to cochlear implantation, and future trends in cochlear implantation. Further, this course will cover current issues in the medical, audiological, speech/language, quality of life, and educational management of children and adults with cochlear implants. Prerequisites: BBSC majors only and department consent required. (3-0) Y

COMD 7325 Hearing and Deafness (3 semester credit hours) Introduction to issues, assessment, and management of hearing-impairment. Includes principles and prerequisites for intervention, amplification, aural habilitation programs, sign language, and Deaf culture. This course is offered in an online format only. Prerequisites: BBSC majors only and department consent required. (3-0) Y

COMD 7336 (HDCD 6365) Social Communication in Early Childhood Disorders (3 semester credit hours) Development of infant and toddler cognitive, social, communication and language skills are explored through major theories, current research and application to disorders. Emphasis is placed on functional assessments and intervention for children with social communication disorders functioning at the prelinguistic and emerging language stages. Prerequisites: BBSC majors only and department consent required. (3-0) S

COMD 7340 (HCS 7340) Research in Communication Sciences and Disorders: What, Why, and How (3 semester credit hours) This course is designed to introduce doctoral students to scientific reasoning and methods using examples from the astonishing variety of research on human communication and its disorders. The goal is to provide students with conceptual tools (e.g., appraising research quality, matching research questions with research designs) and practical tools (e.g., managing literature searches, visualizing data) that they will need to transform an area of interest into a credible and feasible research study. Although the course includes basic statistical concepts that are useful in planning many research studies (e.g., relationships among Type I and Type II errors, effect size, and sample size), the emphasis is on statistical reasoning, not on specific statistical procedures. Prerequisites: BBSC majors only and department consent required. (3-0) S

COMD 7345 Pediatric Traumatic Brain Injury (3 semester credit hours) Assessment and management of acquired brain injury in children including linguistic, cognitive, psychosocial, educational, and neurological factors within a brain plasticity framework. Prerequisites: BBSC majors only and department consent required.
COMD 7379 (HCS 7379) Current Research in Autism (3 semester credit hours) Exploration of research theories related to Autism Spectrum Disorders (ASD) and the implications the disability has on an individual's learning, behavior and ability to process information. Topics in different semesters include: diagnostic classification, the evaluation process, current theoretical models, intervention models, research on potential causes and treatments, provisions for service delivery and areas of impairment. May be repeated for credit as topics vary (9 semester credit hours maximum). Prerequisites: BBSC majors only and department consent required. (3-0) Y

COMD 7384 Augmentative Communication (3 semester credit hours) Components and dimensions of augmentative and alternative communication (AAC) systems. AAC assessment and intervention for individuals with congenital and acquired complex communication needs. Includes hands on AAC equipment labs. Prerequisites: BBSC majors only and department consent required. (3-0) Y

COMD 7392 Language Disorders and Reading Disabilities (3 semester credit hours) The relationships among language disorders and reading disabilities, including dyslexia. Literacy development, assessment issues and methods, and evidence-based approaches to improving literacy skills in children with a variety of developmental disabilities. Prerequisites: BBSC majors only and department consent required. (3-0) Y

COMD 7V56 Bilingual Speech-Language Assessment and Intervention (1-3 semester credit hours) Evaluation procedures and intervention strategies with bilingual populations, including children designated as English learners. Focus on changing demographics, typical and impaired patterns of dual language acquisition, acculturation, bilingual education models and differentiating between language difference vs. language disorders. Knowing a second language is NOT required. Prerequisites: BBSC majors only and department consent required. ([1-3]-0) T

COMD 7V62 Seminar in Autism (1-3 semester credit hours) Issues concerning the diagnosis and theories of autism. The development of social, communication/language, and cognitive skills in autism, as well as various therapeutic approaches. Prerequisites: BBSC majors only and department consent required. ([1-3]-0) Y

COMD 7V68 Cognitive Rehabilitation (1-3 semester credit hours) Study of normal and impaired aspects of cognition as it relates to communication, including attention, memory, and executive function with an emphasis on current evidence supporting evaluation and treatment in the adult rehabilitation setting. Prerequisites: BBSC majors only and department consent required. ([1-3]-0) R

COMD 7V73 Seminar in Hearing and Speech Science (1-6 semester credit hours) Current topics in hearing and speech science. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. ([1-6]-0) T

COMD 7V82 Special Topics in Communication Disorders (1-6 semester credit hours) Selected topics and current research in communication disorders. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and instructor consent required. ([1-6]-0) R

COMD 7V86 Special Topics in Child Language (1-6 semester credit hours) Current issues in child language emphasizing research on intervention practices. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. ([1-6]-0) Y

COMD 7V89 Mild Cognitive Impairment, Alzheimer's Disease and Related Disorders (2-3 semester credit hours) Clinical characteristics, diagnosis, assessment, and a strength-based approach to intervention of adults with mild cognitive impairment and different dementias including Alzheimer's disease, and the frontotemporal dementias. Department consent required. ([2-3]-0) Y
**COMD 7V90** Special Topics in Hearing and Speech Science (1-6 semester credit hours) Special topics and current research in hearing and speech science. May be repeated for credit as topics vary (6 semester credit hours maximum). Prerequisites: BBSC majors only and department consent required. ([1-6]-0) Y

**COMD 7V91** Methods in Communication Disorders (1-6 semester credit hours) Issues related to methods of assessment and intervention in communication disorders. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. ([1-6]-0) Y

**COMD 7V98** Directed Study in Communication Disorders (1-9 semester credit hours) Individualized program of study which may include reading, research implementation of clinical strategies and/or other designated activities. Pass/Fail only. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**COMD 8V80** Research in Communication Disorders (1-9 semester credit hours) Supervised research experience in communication disorders. Pass/Fail only. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. ([1-9]-0) S

**Behavioral and Brain Sciences**

**HCS 5314 (ACN 5314)** Computational Modeling Methods in Behavioral and Brain Sciences (3 semester credit hours) Computational Neuroscience, Cognitive Neural Modeling, Machine Learning, and Mathematical Psychology modeling methodologies are introduced through the use of computer-based simulation modeling experiments. Emphasizes creative applications of these research methodologies. Prerequisites: BBSC majors only and department consent required. (3-0) T

**HCS 6110 (ACN 6110)** Fundamentals of Functional Brain Imaging Lab (1 semester credit hour) This course covers applications of functional neuroimaging data collection and analysis methods focusing on methods of data collection, and experimental design, data analysis methods, and how they are related. Students work in the lab to develop proficiency with neuroimaging analysis software tools. Class meetings will consist of lectures, hands-on demonstrations, and work-through sessions with readily available data sets to learn the mechanics of basic fMRI data analysis. Corequisite: **ACN 6310** or **HCS 6310**. Prerequisites: BBSC majors only and department consent required. (0-3) Y

**HCS 6302** Issues in Behavioral and Brain Sciences - Part I (3 semester credit hours) Doctoral proseminar on current theory and research in cognition and neuroscience, communication sciences and disorders, and psychological sciences. Pass/Fail only. Prerequisite: BBS doctoral students only or instructor consent required. (3-0) Y

**HCS 6310 (ACN 6310)** Fundamentals of Functional Brain Imaging (3 semester credit hours) In-depth topics in brain imaging including neuroimaging detection systems (primarily MRI), experimental design, statistical techniques in image analysis, clinical applications of functional neuroimaging, and reviews of pertinent literature using functional brain imaging to illuminate various cognitive and perceptual processes, including language, memory, hearing, and vision. Corequisite: **ACN 6110** or **HCS 6110**. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HCS 6312 (ACN 6312 and PSYC 6312)** Research Methods in Behavioral and Brain Sciences - Part I (3 semester credit hours) This course focuses on applying, understanding, and interpreting various ANOVA-related statistical techniques in a behavioral science context. Students learn the frameworks for hypothesis testing and effect size
estimation. The course provides students with an understanding of the interrelationships among statistical
techniques, and computer skills required for data analyses. Students without the necessary background
knowledge of basic statistics and experimental design will be required to take PSY 3392 before registering for ACN 6312. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 6313 (ACN 6313 and PSYC 6313) Research Methods in Behavioral and Brain Sciences - Part II (3 semester credit hours) This course focuses on applying, understanding, and interpreting regression and analysis of variance -related statistical techniques in a behavioral and brain science context. The course provides students with increased conceptual understanding of topics within regression and analysis of variance (e.g., hierarchical regression analysis, multiple regression with continuous and categorical predictors, regression diagnostics, fixed, random, and mixed effect models), along with computer skills required to interpret data analyses. Prerequisites: (ACN 6312 or HCS 6312 or PSYC 6312) and department consent required. (3-0) Y

HCS 6315 Grant Writing for Researchers (3 semester credit hours) Identifying funding sources appropriate to research needs, formulating a research plan, generating specific aims and a methodological design to address those aims, presentation of preliminary results to show the feasibility of the proposed work, and use of appropriate reference citations. Prerequisites: BBSC majors only and instructor consent required. (3-0) Y

HCS 6316 (ACN 6316 and PSYC 6316) Research Methods in Behavioral and Brain Sciences - Part III (3 semester credit hours) Applying, understanding, and interpreting various advanced multivariate statistical techniques in brain and behavioral science contexts. Includes principal component analyses, simple and multiple correspondence analyses, partial least square methods, multi-table analyses, discriminant analyses, cluster analysis, and structural equation modeling. May be repeated for credit as topics vary (6 semester credit hours maximum). Prerequisite: BBSC majors only. (3-0) R

HCS 6317 (PSYC 6317) Research Methods in Psychology (3 semester credit hours) This course overviews research methods in psychological science. Students learn to design, conduct, and evaluate psychological research. Students will learn to critically evaluate the methodology and conclusions of existing and proposed research. Students will develop a formal research proposal and will learn about the process of grant submission and peer review. Students will also learn about issues related to professionalism, diversity, and ethics in the conduct and publication of research in psychology. Prerequisite: BBSC majors only and department consent required. (3-0) Y

HCS 6319 Scientific Writing (3 semester credit hours) This course covers the fundamentals of effective scientific manuscript writing and de-constructs the peer-review process. Instruction, exercises and assignments will focus primarily on the process of writing and publishing scientific manuscripts. The course will be simultaneous (1) lectures / discussions / class exercises on how to write effectively, concisely, and clearly, and, (2) preparation of an actual scientific manuscript to be ready for submission to a scientific journal at the end of the semester, which will involve one-on-one editing sessions with the instructor. Students must have data available, analyzed, and prepared for a writing project (e.g., first year project) prior to enrollment in this course which is open only to BBS doctoral students. May be repeated for credit as topics vary (6 semester credit hours maximum). Prerequisite: BBS doctoral students only. (3-0) Y

HCS 6322 (ACN 6322) Computational Modeling Methods for Language Understanding (3 semester credit hours) Probabilistic methods for modeling natural language understanding and the statistical analysis of language data. Use of the MATLAB and PERL computer languages for instantiating specific knowledge-based computational theories of natural language understanding with a focus on information retrieval and text mining methods. Emphasizes creative applications of these research methodologies. Prerequisites: BBSC majors only and department consent required. (3-0) R
HCS 6327 (PSYC 6327) Personality (3 semester credit hours) Survey of trait, biological, social-cognitive, analytic, and learning theory approaches to the study of personality. Emphasis on intensive exploration of modern theoretical and empirical work. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 6330 (ACN 6330 and PSYC 6330) Cognitive Science (3 semester credit hours) Cognitive, computational, and neural processing approaches to understanding perception, memory, thought, language, and emotion. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 6331 (ACN 6331 and PSYC 6331) Cognitive Development (3 semester credit hours) Survey of cognitive development theories and research in a variety of domains including perception, memory, language, and problem solving. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 6332 (ACN 6332 and PSYC 6332) Perception (3 semester credit hours) Psychophysical, neurophysiological, and computational foundations of sensation and perception. Basic senses of vision, audition, chemoreception, and tactile processing, with emphasis on understanding the processes that take us from neurons to perception and action. (3-0) R

HCS 6333 (ACN 6333 and PSYC 6333) Memory (3 semester credit hours) Research and theory on the acquisition, representation, and retrieval of information by the mind/brain. Includes information processing and neuropsychological perspectives. Prerequisites: BBSC majors only and department consent required. (3-0) R

HCS 6334 (ACN 6334) Attention (3 semester credit hours) Theory and evidence on the study of attention especially in human vision and audition. Includes perceptual learning, information processing, and neuropsychological approaches. (3-0) R

HCS 6338 (ACN 6338 and PSYC 6338) Functional Neuroanatomy (3 semester credit hours) An introduction to human neuroanatomy organized by major brain system. Function of the neuroanatomy of each major system and relation to neurological disorders associated with damage to the neuroanatomy of the system. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 6340 (ACN 6340) Cellular Neuroscience (3 semester credit hours) Basic neural biology and physiology and principles of synaptic transmission. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 6341 Genes, Brain, and Behavior (3 semester credit hours) Neuroscience is a remarkable interdisciplinary field requiring analysis at multiple levels: behavioral, electrophysiological, and molecular. This course will focus on the basic cellular and molecular mechanisms that control neuronal functioning, with an emphasis on the regulation of gene expression (transcription/translation) via genetic, epigenetic and synapse to nucleus signaling mechanisms. Relevant examples will reference: regulating cellular excitability, LTP, learning and memory, psychiatric and neurological diseases. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 6343 Neurobiology of Learning and Memory (3 semester credit hours) Current research and theory on modifications in the central nervous system that contribute to the processes of learning and memory. Includes an overview of different forms of learning as assessed in model systems, with extensive review of anatomical, cellular, and molecular changes underlying neuronal and behavioral plasticity. Prerequisites: (ACN 6346 or HCS 6346 or PSYC 6346) and department consent required. (3-0) Y

HCS 6346 (ACN 6346 and PSYC 6346) Systems Neuroscience (3 semester credit hours) Integrative systems level study of the nervous system. Aspects of neural mechanisms and circuitry underlying regulation of motor behaviors, sensory and perceptual processing, biological homeostasis, and higher cognitive functions. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 6348 (ACN 6348) Neural Net Mathematics (3 semester credit hours) Introduction to a large class of
statistical machine learning algorithms including unsupervised, supervised, and reinforcement learning machines. Vector calculus and vector calculus-based probability theory with machine learning and artificial neural network modeling applications. Stochastic sequences of mixed random vectors, Bayesian Networks, and Markov random fields. Emphasizes applications of the theory to unsupervised, supervised, and reinforcement learning machines and artificial neural network modeling. Provides required math background for HCS 6349 or ACN 6349.

Prerequisites: (Linear algebra and multivariable calculus and STAT 3341 or equivalent) and BBSC majors only and department consent required. (3-0) T

**HCS 6349 (ACN 6349)** Statistical Machine Learning for Artificial Neural Nets (3 semester credit hours)
Mathematical tools for investigating the asymptotic behavior of both batch and adaptive machine learning algorithms including the Invariant Set Theorem, Zoutendijk-Wolfe convergence theorem, adaptive stochastic approximation methods, and Monte Carlo Markov Chain methods. M-estimation and bootstrap asymptotic statistical theory for characterizing asymptotic behavior of parameter estimates as a function of sample size to support: model selection, specification analysis, and hypothesis testing. Emphasizes applications of the theory to unsupervised, supervised, and reinforcement learning machines and artificial neural network modeling.
Prerequisites: (ACN 6348 or HCS 6348) and BBSC majors only and department consent required. (3-0) T

**HCS 6350 (PSYC 6350)** Social Development (3 semester credit hours) Foundations of social and personality development. Includes survey of major theoretical approaches to the study of temperament, attachment, parenting, aggression, peer relationships, self and gender development, and other contemporary issues.
Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HCS 6357 (PSYC 6357) and HDCD 6319** The Developing Child: Infants and Toddlers (3 semester credit hours) Theories of infant development in multiple content domains (cognitive, social, motor, language, physical) from conception to 24 months. Milestones of development and the understanding of relationship across domains and viewing the child as a "system" within the relationships. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HCS 6359 (HDCD 6320 and PSYC 6320)** The Developing Child: Toddler and Preschool Years (Two to Five Years) (3 semester credit hours) Relevant developmental theories and processes as well as skills acquired in motor, sensory-perceptual, cognitive, and social domains. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HCS 6360** Neural Basis of Speech-Sound Processing (3 semester credit hours) Basic neural mechanisms of speech-sound processing. Discussion of research articles. Prerequisite: BBSC majors only. (3-0) R

**HCS 6363 (ACN 6363)** Text Comprehension Seminar (3 semester credit hours) Current readings in the field of text comprehension and memory. May be repeated for credit as topics vary (6 semester credit hours maximum). Prerequisites: BBSC majors only and instructor consent required. (3-0) R

**HCS 6364** Cortical Plasticity (3 semester credit hours) Basic principles of neural plasticity with special emphasis on cortical plasticity related to development, recovery from injury, and learning. Classic and recent research articles will be discussed Prerequisite: BBSC majors only. (3-0) R

**HCS 6366** Seminar in Auditory Cortical Processing (3 semester credit hours) Basic principles of neural information processing with special emphasis on the central nervous system processes underlying hearing and speech perception. May be repeated for credit (12 semester credit hours maximum). Prerequisite: BBSC majors only. (3-0) T

**HCS 6367 (ACN 6367 and PSYC 6367)** Speech Perception (3 semester credit hours) Current topics and theories in speech perception. Topics include the acoustic correlates of speech sounds and the problem of invariance, the
perception of speech under adverse conditions, the effects of hearing impairment, and models of speech perception. Prerequisites: BBSC majors only and department consent required. (3-0) R

**HCS 6368 (ACN 6368 and PSYC 6368)** Language Development (3 semester credit hours) Advanced study of normal oral language development. The goals of this course are to consider the developmental trajectories of the different components of language; to consider the varied and critical roles of language in human development; to understand the impact of culture, different languages, child factors and the environment on development; and to be introduced to the theoretical perspectives driving research and thinking in this area of inquiry. Prerequisite: BBSC majors only. (3-0) Y

**HCS 6372 (ACN 6372)** The Neuroscience of Pain (3 semester credit hours) A systems-oriented course covering the anatomical and physiologic basis of pain. The course describes the basic features of neural processing of pain signals in the spinal cord and brain, the anatomy and the function of the descending systems that can control transmission of pain signals, and peripheral and central sensitization. The physiological and molecular basis for treatment of pain is discussed. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HCS 6373 (ACN 6373)** Intraoperative Neurophysiological Monitoring (IONM) Part I (3 semester credit hours) Part 1 of the course covers the anatomical and physiological basis for the use of electrophysiological techniques in the surgical operating room and clinically in diagnosis of disorders affecting the nervous system. Prerequisite: BBSC majors only. (3-0) Y

**HCS 6374 (ACN 6374)** Intraoperative Neurophysiological Monitoring (IONM) Part II (3 semester credit hours) Part II covers the use of recordings of neuro-electric brain potentials and their interpretation during surgical operations and clinically for diagnostic purposes. The use of electrophysiological methods for guiding implantation of stimulating electrodes deep in the brain and for assisting the surgeon in certain operations are also described. Prerequisite: **ACN 6373** or **HCS 6373**. (3-0) Y

**HCS 6376 (PSYC 6376)** Social Psychology (3 semester credit hours) This course is a graduate-level introduction to the field of social psychology. The primary objective of this class is to acquaint students with some of the major topics and research methods in social psychology. Topics may include social cognition and self-justification, biases in judgment, attitudes and persuasion, conformity, compliance, group dynamics, prejudice and stereotyping, interpersonal attraction and relationships, aggression and altruism, cultural diversity, and applications relevant to these aspects of the human experience. Special attention to research paradigms of interest to students developing their own empirical work. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HCS 6379 (COMD 6379)** Neurological Basis of Language Development (3 semester credit hours) Study of the development of the pre- and postnatal brain and how it relates to the acquisition and development of language throughout the lifespan. Prerequisites: BBSC majors only and department consent required. (3-0) R

**HCS 6388 (ACN 6388)** MATLAB for Brain Sciences (3 semester credit hours) Introduction to MATLAB computer programming. Covers the use of the MATLAB programming language for the purpose of stimulus generation, behavioral data analysis, statistical analyses, and generation of publication quality figures. Prerequisites: BBSC majors only and department consent required. (3-0) R

**HCS 6389 (ACN 6389)** Speech Perception Laboratory (3 semester credit hours) Introduction to the field of speech processing by computer, with primary application to research techniques in the study of speech perception. Prerequisites: BBSC majors only and department consent required. (0-9) T

**HCS 6391** Seminar on Preliteracy Development (3 semester credit hours) Selected topics and current research
in preliteracy development. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. (3-0) R

**HCS 6392** Seminar in Theories of Language Acquisition (3 semester credit hours) A survey and critical exploration of current theories of language acquisition and more general theories of cognitive development that have been applied to language development. Prerequisites: BBSC majors only and department consent required. (3-0) R

**HCS 6395 (ACN 6395 and PSYC 6395)** Cognitive Psychology (3 semester credit hours) Theory and research on perception, learning, thinking, psycholinguistics, and memory. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HCS 7121** Graduate Seminar in Systems Neuroscience (1 semester credit hour) The purpose of this course is to give PhD students in Systems Neuroscience a forum for training in oral presentation skills. Students will be expected to present their research findings in this class in a variety of formats. In addition to presentations by students, outside speakers will be invited to present their findings on current research in Neuroscience. Pass/Fail only. May be repeated for credit (10 semester credit hours maximum). Department consent required. (1-0) S

**HCS 7309 (COMD 7309)** Neural Correlates of Human Cognition: Lesion-Deficit Models (3 semester credit hours) Correlation of brain lesions with cognitive deficits provides a human brain map of the essential anatomy underlying specific cognitive functions. The areas of cognition to be covered using this model include language, episodic memory, semantic memory, working memory, aspects of visuospatial functions, and higher-order motor planning. This knowledge base provides a key framework to combine with the findings of functional neuroimaging (fMRI, PET) in understanding how humans think. Cognitive deficits in patients (e.g., amnesia, aphasia, etc.) will be explained within this framework. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HCS 7310 (ACN 7310)** Advanced Research Methods (3 semester credit hours) Advanced methods of inquiry and analysis unique to cognition and neuroscience, communication sciences and disorders, or psychological sciences. May be repeated for credit as topics vary (12 semester credit hours maximum). Prerequisites: HCS 6313 and department consent required. (3-0) Y

**HCS 7311** Family Psychology (3 semester credit hours) Theory and research on family systems, including topics on family structure, relationships, and processes. Prerequisites: BBSC majors only and instructor consent required. (3-0) R

**HCS 7317** Longitudinal Research Methods (3 semester credit hours) Advanced methods course covering issues related to the design and analysis of multiple waves of data over time. Topics include measurement and attrition, panel models, latent growth curve modeling, and time-varying and invariant predictors. Designed for students interested in development, variability in processes over time, or experimental change. Prerequisites: HCS 6313 and department consent required. (3-0) R

**HCS 7318** Healthy Aging and Neuropathology (3 semester credit hours) This class focuses on understanding how normal age-related deterioration in brain structure and function affects cognition as well as the slow process whereby healthy brains transition to Alzheimer's disease and other cognitive disorders. The course focuses on specific topics each week with an emphasis on understanding compensatory processes that mask disease as well as what the catalysts are for transition to pathology. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HCS 7319** Molecular Target Discovery for Neuroscience and Neurological Disorders (3 semester credit hours) Neurological disorders are prominent in the population but poorly treated by existing therapeutics. The purpose
of this course is to familiarize students working in research environments with the process of identifying and vetting targets for the potential treatment of neurological disorders. Research manuscripts from the recent literature will be assigned, and students will be expected to present data in these papers to their peers and critically discuss findings in the papers. Discussions will focus on future directions for target discovery based on the presented work. Prerequisites: (HCS 6340 or HCS 6346) and departmental consent required. (3-0) R

HCS 7320 (ACN 7320) Topics in Multivariate Data Analysis using R (3 semester credit hours) R programming language (including writing functions and using special packages). Using the R programming language to analyze standard designs used in Behavioral and Brain Science. Includes designing publication ready graphics and analysis of experimental data and surveys. May be repeated for credit as topics vary (9 semester credit hours maximum). Prerequisite: ACN 6313 or HCS 6313 or PSYC 6313 or instructor consent required. Corequisite: HCS 7321. (3-0) Y

HCS 7321 (ACN 7321) Topics in Multivariate Data Analysis Theory (3 semester credit hours) Principal component analysis, correspondence analysis, multidimensional scaling, discriminant analysis, partial least square methods, multi-table analysis, cluster analysis, and various other statistical techniques. Includes discussion of computationally intensive cross-validation inference methods such as jackknife and bootstrap. May be repeated for credit as topics vary (9 semester credit hours maximum). Prerequisite: ACN 6313 or HCS 6313 or PSYC 6313 or instructor consent required. Corequisite: HCS 7320. (3-0) Y

HCS 7330 (ACN 7330) Advanced Functional Brain Imaging (3 semester credit hours) This course explores more in-depth topics such as neuroimaging detection systems, clinical applications of functional neuroimaging, experimental design, statistical techniques in image analysis and reviews of pertinent literature using functional brain imaging to illuminate various cognitive and perceptual processes, such as language, memory, hearing and vision. Prerequisites: BBSC majors only and department consent required. (3-0) R

HCS 7338 (ACN 7338) Brain Connectivity (3 semester credit hours) Systems and cognitive neuroscience based approach towards measuring and understanding patterns of brain connectivity in humans and non-human animals. Prerequisites: (HCS 6346 or HCS 6338) and instructor consent required. (3-0) R

HCS 7340 (COMD 7340) Research in Communication Sciences and Disorders: What, Why, and How (3 semester credit hours) This course is designed to introduce doctoral students to scientific reasoning and methods using examples from the astonishing variety of research on human communication and its disorders. The goal is to provide students with conceptual tools (e.g., appraising research quality, matching research questions with research designs) and practical tools (e.g., managing literature searches, visualizing data) that they will need to transform an area of interest into a credible and feasible research study. Although the course includes basic statistical concepts that are useful in planning many research studies (e.g., relationships among Type I and Type II errors, effect size, and sample size), the emphasis is on statistical reasoning, not on specific statistical procedures. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 7343 (ACN 7343) Neuropharmacology (3 semester credit hours) Biology of neurotransmission in the central nervous system. Includes ionotrophic and metabotropic coupling of all known classes of receptors to both their cellular and systemic effects. Clinical efficacy, side effects, and other issues related to drug use and abuse are covered. Prerequisites: (ACN 6340 or HCS 6340 or ACN 6346 or HCS 6346 or PSYC 6346) and department consent required. (3-0) T

HCS 7351 Aging and the Nervous System (3 semester credit hours) Critical evaluation of research and theory concerning the impact of aging on neuronal function. Cognitive dysfunctions, dementias, and underlying neuropathologies, as well as neurophysiological and neurochemical changes that accompany normal aging. Prerequisites: BBSC majors only and department consent required. (3-0) R
HCS 7352 Seminar in Language Impairments in Children (3 semester credit hours) Advanced study of language impairments in children emphasizing research issues related to these diverse clinical populations. Topics may include SLI, SCI, SELD, deafness, and autism spectrum disorder among others. May be repeated for credit as topics vary. Prerequisites: (COMD 6307 or HCS 6368) and COMD 6308 and instructor consent required. (3-0) T

HCS 7355 Seminar in Psychological Sciences (3 semester credit hours) Selected topics of current research in social or cognitive development. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 7364 Cognitive Neuroscience of Human Memory (3 semester credit hours) Seminar-based class that covers the cognitive neuroscience of human long term memory. It combines a historical perspective with discussion of current controversies and advances. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 7365 Fear and Anxiety: Biology and Causes (3 semester credit hours) The purpose of this course is to discuss and develop a general understanding of the neuroscience of fear and anxiety. The neuroanatomy and function of neural systems that are the basis for fear and other emotions are described. The benefit and harm from fear and anxiety is discussed. Prerequisites: BBSC majors only and department consent required. (3-0) R

HCS 7371 Neuroplasticity and Disorders of the Nervous System (3 semester credit hours) Understanding the anatomical and functional bases for human neuroplasticity. This is a systems-oriented course that covers aspects of the pathophysiology of the nervous system that are related disorders where expression of neuroplasticity plays an important role. The course covers the neuroscience bases for expression of neuroplasticity and how reorganization of the nervous system may cause pain, tinnitus, paresthesia, and other symptoms of neural disorders. The role of the little known non-classical sensory pathways is discussed and hyperactivity of motor systems is covered. The organization of motor systems, pain circuits, and sensory systems are also included in the course. Department consent required. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 7372 (ACN 7372) Seminar in Neuroscience (3 semester credit hours) Selected topics and current research in neuroscience. May be repeated for credit as topics vary (12 semester credit hours maximum). Prerequisite: BBSC majors only. (3-0) Y

HCS 7376 (HDCD 6385 and PSYC 6335) Child Psychopathology (3 semester credit hours) Major classes of childhood psychopathology manifested during infancy through adolescence. Normal personality development as a basis for identifying psychopathology. Issues of etiology, diagnosis, prognosis and social policy. Prerequisites: BBSC majors only and department consent required. (3-0) R

HCS 7379 (COMD 7379) Current Research in Autism (3 semester credit hours) Exploration of research theories related to Autism Spectrum Disorders (ASD) and the implications the disability has on an individual's learning, behavior and ability to process information. Topics in different semesters include: diagnostic classification, the evaluation process, current theoretical models, intervention models, research on potential causes and treatments, provisions for service delivery and areas of impairment. May be repeated for credit as topics vary (9 semester credit hours maximum). Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 7382 (PSYC 7382 and HDCD 7382) Health Psychology (3 semester credit hours) This course is a graduate-level introduction to the field of health psychology. The course will utilize a biopsychosocial perspective to understand the biological, social, and psychological factors associated with health and well-being. Topics may include stress and coping, developmental origins of health, chronic disease, and psychoneuroimmunology. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HCS 7V71 Topics in Communication Sciences and Disorders (1-6 semester credit hours) Selected topics and
current research in communication sciences and disorders. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. ([1-6]-0) R

**HCS 7V97** Directed Individual Study in Psychological Sciences (1-9 semester credit hours) Individualized program of study which may include reading, research, or other designated activities. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) Y

**HCS 7V98** Directed Individual Study in Communication Sciences and Disorders (1-9 semester credit hours) Individualized program of study which may include reading, research, implementation of clinical strategies, and/or other designated activities. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**HCS 7V99** Directed Individual Study in Neuroscience (1-9 semester credit hours) Individualized program of study which may include reading, research, or other designated activities. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**HCS 8V50** Doctoral Readings and Research Seminar (1-6 semester credit hours) Seminar for advanced doctoral students on current issues and research in Behavioral and Brain Sciences. Pass/Fail only. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and instructor consent required. ([1-6]-0) R

**HCS 8V80** Research in Behavioral and Brain Sciences (1-9 semester credit hours) Supervised research experience. Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**HCS 8V87** Research in Psychological Sciences (1-9 semester credit hours) Supervised research experience. Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**HCS 8V88** Research in Communication Sciences and Disorders (1-9 semester credit hours) Supervised research experience. Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**HCS 8V89** Research in Neuroscience (1-9 semester credit hours) Supervised research experience. Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**HCS 8V97** Dissertation in Psychological Sciences (1-9 semester credit hours) Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**HCS 8V98** Dissertation in Communication Sciences and Disorders (1-9 semester credit hours) Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**HCS 8V99** Dissertation in Neuroscience (1-9 semester credit hours) Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) S

**Human Development and Early Childhood Disorders**

**HDCD 5350** Introduction to Child Life (3 semester credit hours) Study of the historical and theoretical perspectives on the development of the child life field. Exploration of the fundamental skills required to help
children and families cope with the stress of the health care experience. Prerequisite: BBSC majors only. (3-0) Y

**HDCD 6310** Working with Parents and Caregivers (3 semester credit hours) Skills needed by professionals to work with parents and caregivers of children with special needs. Topics address skills needed to assess parent strengths and resources, and to assist parents in understanding and promoting their children's development and adjustment; including effective communication techniques, and strategies to enhance parental efficacy to advocate for their children. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HDCD 6312** Atypical Development (3 semester credit hours) Disorders of development from conception through preschool. Effects of developmental impairments on the child, family, and the environment and prognosis and treatment options. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HDCD 6315** Assessment Theory (3 semester credit hours) Latest developments in the field of assessment with young children, including behavioral observation, contextual multi-faceted assessment, and inclusion of the family. Training in traditional psychometrics and assessment tools/techniques. Prerequisite or Corequisite: **HDCD 6319** and department consent required. (3-0) S

**HDCD 6316** Developmental Assessment (3 semester credit hours) Play-based, curriculum-based and alternative approaches to assessment of functional-emotional development within the dynamic interaction of the parent-child relationship. Emphasis is on clinical observation skills and the interpretation and integration of diagnostic transdisciplinary information to determine diagnostic classification. Prerequisites: **HDCD 6315** and **HDCD 6319** and department consent required. (3-0) S

**HDCD 6319** (HCS 6357 and PSYC 6357) The Developing Child: Infants and Toddlers (3 semester credit hours) Theories of infant development in multiple content domains (cognitive, social, motor, language, physical) from conception to 24 months. Milestones of development and the understanding of relationship across domains and viewing the child as a "system" within the relationships. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HDCD 6320** (HCS 6359 and PSYC 6320) The Developing Child: Toddler and Preschool Years (Two to Five Years) (3 semester credit hours) Relevant developmental theories and processes as well as skills acquired in motor, sensory-perceptual, cognitive, and social domains. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HDCD 6330** Families and Culture (3 semester credit hours) The purpose of this seminar is to investigate interactions between family, culture and child development. Topics will include intercultural competence, cultural identity and biases, intercultural communication, and cultural variations in family values and practices. The impact of the students' own culture, attitudes, and beliefs in working with families from diverse backgrounds will be emphasized. Prerequisites: BBSC majors only and department consent required. (3-0) R

**HDCD 6335** Intervention Paradigms (3 semester credit hours) Historical, theoretical, practice, and research bases for early intervention paradigms. Research methods to evaluate the effectiveness of early intervention programs and determine evidence-based practice. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**HDCD 6351** Play Matters (3 semester credit hours) Study of the importance of play for child development and its unique value as an evaluative and remedial tool in early intervention. Combines didactic and experiential elements to facilitate an integrated understanding of play-based approaches to working children and families. Includes guided experience facilitating a playgroup program for young children and their parents. Prerequisites: BBSC majors only and instructor consent required. (3-0) Y
HDCD 6355 Family Outreach and Assessment (3 semester credit hours) This practicum is designed to provide students, as part of a 2-3 person team, supervised experiences with young children from diverse backgrounds, at selected off-campus sites. Emphasis is on assessment, professional report writing, communicating assessment results orally to the families and other professionals, the referral process, and working together in small teams. Pass/Fail only. Prerequisites: BBSC majors only and instructor consent required. (3-0) S

HDCD 6360 Behavior Management (3 semester credit hours) Observational methodology in behavioral assessment and a review of principles and procedures of behavior change from social learning and applied behavior analysis perspectives. Particular attention will be given to the design, implementation, and evaluation of behavioral interventions with children and families. Prerequisite: BBSC majors only. (3-0) Y

HDCD 6365 (COMD 7336) Social Communication in Early Childhood Disorders (3 semester credit hours) Development of infant and toddler cognitive, social, communication and language skills are explored through major theories, current research and application to disorders. Emphasis is placed on functional assessments and intervention for children with social communication disorders functioning at the prelinguistic and emerging language stages. Prerequisites: BBSC majors only and department consent required. (3-0) S

HDCD 6370 Intervention with Young Children (3 semester credit hours) Emphasis on methods and procedures for facilitating development of high risk, developmentally delayed young children through relationship-based intervention. Reviews the contributions and perspectives of various early intervention models and disciplines. Students design and implement individualized intervention treatment plans. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HDCD 6385 (HCS 7376 and PSYC 6335) Child Psychopathology (3 semester credit hours) Major classes of childhood psychopathology manifested during infancy through adolescence. Normal personality development as a basis for identifying psychopathology. Issues of etiology, diagnosis, prognosis and social policy. Prerequisites: BBSC majors only and department consent required. (3-0) R

HDCD 6390 Infant Mental Health (3 semester credit hours) How children's healthy development is impacted by the attachment-separation process and social-emotional development. Theoretical foundations for current practice. Addresses contributing factors, including brain development, temperament, trauma, multiple separations, and parent attachment styles. Overview of intervention programs that address relationship disruptions or disorders. Prerequisite: BBSC majors only. (3-0) Y

HDCD 6395 Medical and Biobehavioral Factors in Early Childhood Disorders (3 semester credit hours) The normal functioning of organ systems and the most common malformations, dysfunction, and diseases. Effects of these disorders on the child and family. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HDCD 6V20 Practicum/Internship in Early Childhood Disorders (3 or 6 semester credit hours) Supervised participation in on-site, early intervention, preschool and private therapy, clinics, hospitals, and other settings for young children with special needs. Includes professional activities such as conducting assessments, intervention, service coordination, and interdisciplinary teaming. Bi-weekly seminars address reflective practice as a tool for professional growth, ethical decision making in real situations, and professional use of self. Taken for 3 hours credit coincident with practicum placement and for 6 hours credit coincident with internship placement. Pass/Fail only. May be repeated for credit with the supervisor's prior approval. Prerequisites: BBSC majors only and instructor consent required. ([3 or 6]-0) S

HDCD 6V81 Special Topics in Human Development and Early Childhood Disorders (1-9 semester credit hours) May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required.
HDCD 7382 (HCS 7382 and PSYC 7382) Health Psychology (3 semester credit hours) This course is a graduate-level introduction to the field of health psychology. The course will utilize a biopsychosocial perspective to understand the biological, social, and psychological factors associated with health and well-being. Topics may include stress and coping, developmental origins of health, chronic disease, and psychoneuroimmunology. Prerequisites: BBSC majors only and department consent required. (3-0) Y

HDCD 7V80 Independent Research (1-6 semester credit hours) Individualized program of study which includes research and/or other designated activities. Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-6]-0) S

HDCD 7V98 Independent Study (1-6 semester credit hours) Individualized program of study which may include reading, research, and/or other designated activities. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and instructor consent required. ([1-6]-0) S

Psychological Sciences

PSYC 6312 (ACN 6312 and HCS 6312) Research Methods in Behavioral and Brain Sciences - Part I (3 semester credit hours) This course focuses on applying, understanding, and interpreting various ANOVA-related statistical techniques in a behavioral science context. Students learn the frameworks for hypothesis testing and effect size estimation. The course provides students with an understanding of the interrelationships among statistical techniques, and computer skills required for data analyses. Students without the necessary background knowledge of basic statistics and experimental design will be required to take PSY 3392 before registering for ACN 6312. Prerequisites: BBSC majors only and department consent required. (3-0) Y

PSYC 6313 (ACN 6313 and HCS 6313) Research Methods in Behavioral and Brain Sciences - Part II (3 semester credit hours) This course focuses on applying, understanding, and interpreting regression and analysis of variance-related statistical techniques in a behavioral and brain science context. The course provides students with increased conceptual understanding of topics within regression and analysis of variance (e.g., hierarchical regression analysis, multiple regression with continuous and categorical predictors, regression diagnostics, fixed, random, and mixed effect models), along with computer skills required to interpret data analyses. Prerequisites: (ACN 6312 or HCS 6312 or PSYC 6312) and department consent required. (3-0) Y

PSYC 6316 (ACN 6316 and HCS 6316) Research Methods in Behavioral and Brain Sciences - Part III (3 semester credit hours) Applying, understanding, and interpreting various advanced multivariate statistical techniques in brain and behavioral science contexts. Includes principal component analyses, simple and multiple correspondence analyses, partial least square methods, multi-table analyses, discriminant analyses, cluster analysis, and structural equation modeling. May be repeated for credit as topics vary (6 semester credit hours maximum). Prerequisite: BBSC majors only. (3-0) R

PSYC 6317 (HCS 6317) Research Methods in Psychology (3 semester credit hours) This course overviews research methods in psychological science. Students learn to design, conduct, and evaluate psychological research. Students will learn to critically evaluate the methodology and conclusions of existing and proposed research. Students will develop a formal research proposal and will learn about the process of grant submission and peer review. Students will also learn about issues related to professionalism, diversity, and ethics in the conduct and publication of research in psychology. Prerequisite: BBSC majors only and department consent required. (3-0) Y
PSYC 6318 Special Topics in Psychological Sciences (3 semester credit hours) Selected topics of current research in psychological sciences. May be repeated for credit as topics vary. Prerequisites: BBSC majors only and department consent required. (3-0) R

PSYC 6320 (HCS 6359 and HDCD 6320) The Developing Child: Toddler and Preschool Years (Two to Five Years) (3 semester credit hours) Relevant developmental theories and processes as well as skills acquired in motor, sensory-perceptual, cognitive, and social domains. Prerequisites: BBSC majors only and department consent required. (3-0) Y

PSYC 6327 (HCS 6327) Personality (3 semester credit hours) Survey of trait, biological, social-cognitive, analytic, and learning theory approaches to the study of personality. Emphasis on intensive exploration of modern theoretical and empirical work. Prerequisites: BBSC majors only and department consent required. (3-0) Y

PSYC 6330 (ACN 6330 and HCS 6330) Cognitive Science (3 semester credit hours) Cognitive, computational, and neural processing approaches to understanding perception, memory, thought, language, and emotion. Prerequisites: BBSC majors only and department consent required. (3-0) Y

PSYC 6331 (ACN 6331 and HCS 6331) Cognitive Development (3 semester credit hours) Survey of cognitive development theories and research in a variety of domains including perception, memory, language, and problem solving. Prerequisites: BBSC majors only and department consent required. (3-0) Y

PSYC 6332 (ACN 6332 and HCS 6332) Perception (3 semester credit hours) Psychophysical, neurophysiological, and computational foundations of sensation and perception. Basic senses of vision, audition, chemoreception, and tactile processing, with emphasis on understanding the processes that take us from neurons to perception and action. (3-0) R

PSYC 6333 (ACN 6333 and HCS 6333) Memory (3 semester credit hours) Research and theory on the acquisition, representation, and retrieval of information by the mind/brain. Includes information processing and neuropsychological perspectives. Prerequisites: BBSC majors only and department consent required. (3-0) R

PSYC 6334 (HCS 6335) Child Psychopathology (3 semester credit hours) Major classes of childhood psychopathology manifested during infancy through adolescence. Normal personality development as a basis for identifying psychopathology. Issues of etiology, diagnosis, prognosis and social policy. Prerequisites: BBSC majors only and department consent required. (3-0) R

PSYC 6338 (ACN 6338 and HCS 6338) Functional Neuroanatomy (3 semester credit hours) An introduction to human neuroanatomy organized by major brain system. Function of the neuroanatomy of each major system and relation to neurological disorders associated with damage to the neuroanatomy of the system. Prerequisites: BBSC majors only and department consent required. (3-0) Y

PSYC 6346 (ACN 6346 and HCS 6346) Systems Neuroscience (3 semester credit hours) Integrative systems level study of the nervous system. Aspects of neural mechanisms and circuitry underlying regulation of motor behaviors, sensory and perceptual processing, biological homeostasis, and higher cognitive functions. Prerequisites: BBSC majors only and department consent required. (3-0) Y

PSYC 6350 (HCS 6350) Social Development (3 semester credit hours) Foundations of social and personality development. Includes survey of major theoretical approaches to the study of temperament, attachment, parenting, aggression, peer relationships, self and gender development, and other contemporary issues. Prerequisites: BBSC majors only and department consent required. (3-0) Y

PSYC 6357 (HCS 6357 and HDCD 6319) The Developing Child: Infants and Toddlers (3 semester credit hours) Theories of infant development in multiple content domains (cognitive, social, motor, language, physical) from
conception to 24 months. Milestones of development and the understanding of relationship across domains and viewing the child as a "system" within the relationships. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**PSYC 6367 (ACN 6367 and HCS 6367)** Speech Perception (3 semester credit hours) Current topics and theories in speech perception. Topics include the acoustic correlates of speech sounds and the problem of invariance, the perception of speech under adverse conditions, the effects of hearing impairment, and models of speech perception. Prerequisites: BBSC majors only and department consent required. (3-0) R

**PSYC 6368 (ACN 6368 and HCS 6368)** Language Development (3 semester credit hours) Advanced study of normal oral language development. The goals of this course are to consider the developmental trajectories of the different components of language; to consider the varied and critical roles of language in human development; to understand the impact of culture, different languages, child factors and the environment on development; and to be introduced to the theoretical perspectives driving research and thinking in this area of inquiry. Prerequisite: BBSC majors only. (3-0) Y

**PSYC 6376 (HCS 6376)** Social Psychology (3 semester credit hours) This course is a graduate-level introduction to the field of social psychology. The primary objective of this class is to acquaint students with some of the major topics and research methods in social psychology. Topics may include social cognition and self-justification, biases in judgment, attitudes and persuasion, conformity, compliance, group dynamics, prejudice and stereotyping, interpersonal attraction and relationships, aggression and altruism, cultural diversity, and applications relevant to these aspects of the human experience. Special attention to research paradigms of interest to students developing their own empirical work. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**PSYC 6395 (ACN 6395 and HCS 6395)** Cognitive Psychology (3 semester credit hours) Theory and research on perception, learning, thinking, psycholinguistics, and memory. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**PSYC 7382 (HCS 7382 and HDCD 7382)** Health Psychology (3 semester credit hours) This course is a graduate-level introduction to the field of health psychology. The course will utilize a biopsychosocial perspective to understand the biological, social, and psychological factors associated with health and well-being. Topics may include stress and coping, developmental origins of health, chronic disease, and psychoneuroimmunology. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**PSYC 7V50** Internship in Psychological Sciences (1-6 semester credit hours) Applied placement in community agency or other approved site. Pass/Fail only. May be repeated for credit (6 semester credit hours maximum). Prerequisites: BBSC majors only and department consent required. ([1-6]-0) S

**PSYC 8V80** Research in Behavioral and Brain Sciences (1-9 semester credit hours) Supervised research experience. Pass/Fail only. May be repeated for credit. Prerequisites: BBSC majors only and instructor consent required. ([1-9]-0) Y