Applied Cognition and Neuroscience

**ACN 5314 (HCS 5314)** Computational Modeling Methods in Behavioral and Brain Sciences (3 semester credit hours) Historical introduction to machine learning algorithms from a cognitive-neuroscience perspective. Includes an introduction to important and widely used computational modeling methodologies in psychology, neuroscience, and machine learning. No mathematical prerequisites and no computer programming prerequisites, but students will use the computer in simulation experiments. 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: Speech-Language Pathology M.S. students 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. 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

**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 6323 (HCS 6323)** Neurophysiology (3 semester credit hours) This course focuses on the elements of neural functions ranging from the kinetics of channels in excitable membranes to the collective behavior of real neural networks. Prerequisites: (ACN 6340 or HCS 6340) and department consent required. (3-0) Y

**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 language, memory, social cognition, and learning. 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, neuropsychological and cognitive neuroscience 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 consideration of automatic and controlled processes, the time course of perceptual processing, and the role of working memory. (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) A detailed study of neural physiology and the principles of synaptic transmission. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**ACN 6341** Foundations of Human-Computer Interaction (3 semester credit hours) Principles of human factors and technology trends within human-computer interaction (HCI). Discussions of the relevance of cognitive science methodologies and findings. Exploration of HCI research and practice through readings in journal articles and research reports. Department consent required. (3-0) Y

**ACN 6342** Applied Human-Computer Interaction (3 semester credit hours) Broad overview of how human-computer interaction (HCI) informs the user-centered design (UCD) process. Practical experience in the core methods of user experience (UX) design and research throughout the product development lifecycle.
ACN 6344 Human-Computer Interaction Lab (3 semester credit hours) Exploration of advanced topics in human-computer interaction (HCI) in both research and industry. Practical experience with latent methods used in user experience design and research that build upon core methods introduced in ACN 6342. Prerequisite: ACN 6342 or instructor consent required. (3-0) Y

ACN 6345 (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 reviews 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

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) Vector calculus, Radon-Nikodym density functions, vector calculus-based probability theory, Markov chains, and Markov random fields with machine learning and artificial neural network modeling applications. Emphasizes applications of theory to unsupervised, supervised, and reinforcement learning machines and deep learning. This course is a required prerequisite for ACN 6349 and HCS 6349. Prerequisites: Linear algebra and calculus and (STAT 3341 or equivalent) and department consent required. (3-0) T

ACN 6349 (HCS 6349) Statistical Machine Learning (3 semester credit hours) Mathematical tools for investigating the asymptotic behavior of both batch and adaptive machine learning algorithms including the 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 theory to unsupervised, supervised, and reinforcement learning machines and deep learning. Prerequisites: (ACN 6348 or HCS 6348) 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 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)
Covers the anatomical and physiological basis for the use of electrophysiological techniques in the surgical operating room, modalities that are utilized, and surgical procedures that are monitored. Prerequisite: BBSC majors only. (3-0) Y

**ACN 6374 (HCS 6374)** Intraoperative Neurophysiological Monitoring (IONM) Part II (3 semester credit hours)
Covers recordings of neuro-electric brain potentials and their interpretation during high-risk surgical procedures and clinically for diagnostic and therapeutic purposes. The use of various neurophysiological methods for guiding implantation of stimulating electrodes deep in the brain and for assisting the surgeon in certain operations are also described. This course will cover an understanding of the various IONM techniques for different surgical procedures, including the brain, spine, and peripheral nerve surgeries. Students will be exposed to the basics and advance knowledge of neurophysiological monitoring techniques. IONM Part II, focusing on the national professional competencies, professional standards of practice, and evidence-based theory, is presented. The students will also learn to utilize research skills to explore the latest protocols and standards of practice. This course is second in two-part sequence to prepare the students for the Certification in Intraoperative Neurophysiological Monitoring (CNIM) examination administered by ABRET. IONM Part II is a very interactive course, and the students are expected and encouraged to participate in class discussions. Prerequisite: **ACN 6373** or **HCS 6373**. (3-0) Y

**ACN 6375 (HCS 6375)** IONM Special Topics (3 semester credit hours) Special topics in the area of Intraoperative Neurophysiological Monitoring (IONM). May be repeated for credit as topics vary. Prerequisites: **ACN 6373** or **HCS 6373** or **ACN 6374** or **HCS 6374** or instructor consent) and BBSC majors only. (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. No computer programming prerequisites but students will learn MATLAB programming. Prerequisites: BBSC majors only and department consent required. (3-0) Y

**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. Lab fee of $30 required. 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)

**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)

**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). Prerequisite: **ACN 6313** or **HCS 6313** or **PSYC 6313** or instructor consent required. (3-0)

**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)

**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 6313** or **PSYC 6313** or instructor consent required. Corequisite: **ACN 7320**. (3-0)

**ACN 7324** (AUD 7324 and COMD 7324) Seminar in Cochlear Implants and Technology for Persons Who are Deaf or Hard of Hearing (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. This course also has a complementary laboratory course. Prerequisites: BBSC majors only and department consent required. (3-0)

**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)

**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)

**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)

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) Setting up equipment utilized in audiological diagnosis and assistive technology fitting and verification. Review of measurement techniques for basic electronics, room acoustics/reverberation, and digital signal processing with reference to applicable ANSI standards. Laboratory exercises involve use of sound level meters, transducers, multimeters, wireless technology, and software analysis tools. 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, cochlear mechanics, 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 audiology 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) This course covers 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 hearing loss, developmental delays from cognitive deficits or physical exceptions. 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 7321** 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, research, and multidisciplinary management of tinnitus, a phantom auditory perception. The course covers peripheral and neural models of tinnitus and 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 of noise-induced damage to the inner ear and prevention of noise-induced hearing disorders. Focuses on hearing loss prevention in adults with occupational noise exposure. Includes hearing loss prevention in musicians, Service members, children, and others; also includes 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. 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. 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 Who are Deaf or Hard of Hearing (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. This course also has a complementary laboratory course. 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 remote microphone 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 remote microphone 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) Clinical management of the hearing aid patient and hearing aid selection. Post-fitting verification and verification of amplification systems. Advanced validation of remote microphones for children and adults. Examination of new developments in hearing aid technologies, and pre and post fitting counseling issues. Prerequisites: BBSC majors only and department consent required. Corequisite: AUD 6v20. (3-0) Y

AUD 7330 Advanced Diagnostic Assessment (3 semester credit hours) This course is designed to offer an in-depth approach to the comprehensive evaluation of the dizzy patient. Subject matter includes review of the anatomy and physiology of the peripheral and central vestibular and how it relates to site of lesion diagnosis, and in-depth interpretation and analysis of ENG/VNG, Electrocochleography, Auditory Brainstem Response testing, rotational vestibular assessment, VHIT, OVEMP, CVEMP, and CDP testing using real case scenarios and linking results to diagnosis of the most common audio vestibular disorders. Department consent required. (3-0) Y

AUD 7338 Research in Audiology (3 semester credit hours) Review of the principles of research, including the relationship between working hypotheses, methodology, data analysis, 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: Coursework in articulation disorders. 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 function. 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 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 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 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 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. Knowing a second language is NOT required. May be repeated for credit (6 semester credit hours maximum). Recommended prerequisite: **COMD 7V56**. 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 7307** Advanced Topics in Adult Dysphagia (3 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. MBS interpretation using MBSImP. Family and patient counseling/education. Ethical issues and decision-making. Prerequisites: **COMD 7303** 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: Functional Localization (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 7310** Neural Correlates of Human Cognition (3 semester credit hours) Practical application of principles of brain-behavior correlation that were described in Neural Correlates of Human Cognition: Functional Localization course. Students will attend/telemonitor clinical neurobehavioral assessments of cognitive disorders or will view recordings of these assessments. Cases will then be discussed as to the cognitive dysfunctions identified and the disease processes underlying these deficits. Prerequisites: (HCS 7309 or COMD 7309) and instructor consent required. (3-0) Y

**COMD 7320** Speech Sound Disorders in Children: From Articulation to Phonology (3 semester credit hours) An integrative view of speech sound disorders, from articulatory (i.e., speech motor) to language (i.e., phonological) levels. Developmentally, the course will span pre-linguistic, early linguistic, and school-age periods. Within this course, students will read basic and clinical literature and develop evidence-based assessment and intervention approaches for children with speech sound disorders. 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 Who are Deaf or Hard of Hearing (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. This course also has a complementary laboratory course. 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 adults and children with hearing-impairment. Includes principles and prerequisites for intervention, assistive technology, 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) Examines the typical developmental trajectory of social cognition and social-communication in the first two years of life, and assessment/intervention strategies for identifying and treating children with social communication problems. The course is divided into two main sections. The first section focuses on the three major components of Evidence-Based Practices (E3BP): scientific evidence; individual characteristics; and professional expertise. The second section focuses on functional evaluation of social communication in prelinguistic and emerging language children. Prerequisites: BBSC majors only and department consent...
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. (3-0) S

COMD 7354 (HCS 7354) Neural Basis of Music and Language (3 semester credit hours) Music and language are integral and universal components of human nature, as proven by their ubiquity across all cultures. There is a growing body of evidence indicating connections between music and language abilities. The advent of state-of-the-art neuroscience technology allows us to study the relations more systematically at the neural level. This course is designed to offer a general overview of the neuroscience of speech, language, and music, a glimpse of research in this emerging discipline, and a sample of the wide variety of current and possible applications for speech/language interventions of clinical and aging populations. The course does not require a background in neuroscience. Prerequisite: BBSC majors only or instructor consent required. (3-0) T

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 7387 Developmental Neurobiology of Language and Cognition (3 semester credit hours) Consideration of current neurological data concerning the pre/postnatal development of the brain and how changes in brain structure and function provide the foundations of children's language development and language disorders. We will examine models of the neural substrates and circuitry underpinning developmental changes in language, cognitive control and working memory, episodic memory, and visual face processing in both typical (monolingual and bilingual) language users and in children with developmental language disorders including specific language impairment, reading disabilities, autism spectrum disorder, and cognitive-communicative language disorders. Prerequisites: (COMD 6308 and COMD 6377) or instructor consent required. (3-0) Y

COMD 7392 Language Disorders and Reading Disabilities (3 semester credit hours) The relationships between language disorders and reading disabilities, including dyslexia. Literacy development, assessment issues and methods, and evidence-based approaches to improving language and literacy skills in children with a variety of language-based reading disabilities and/or 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) Current issues concerning major theories, current research and their application to treatment of individuals with ASD. 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 Speech Science (1-6 semester credit hours) Current topics in 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 Speech-Language Pathology (1-6 semester credit hours) Selected topics and current research in speech-language pathology. 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 Language (1-6 semester credit hours) Current issues in language including 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 7V91** Methods in Speech-Language Pathology (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 Speech-Language Pathology (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

## Behavioral and Brain Sciences

**HCS 5314 (ACN 5314)** Computational Modeling Methods in Behavioral and Brain Sciences (3 semester credit hours) Historical introduction to machine learning algorithms from a cognitive-neuroscience perspective. Includes an introduction to important and widely used computational modeling methodologies in psychology, neuroscience, and machine learning. No mathematical prerequisites and no computer programming prerequisites, but students will use the computer in simulation experiments. 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 (3 semester credit hours) Doctoral proseminar on current theory and research in cognition and neuroscience; speech, language, and hearing sciences; and
psychology. 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** Scientific and Grant Writing (3 semester credit hours) Scientific writing as applied to the development of a compelling and programmatic line of research. The course will emphasize how to craft a successful grant proposal. Students will produce their own grant proposals, which will be critiqued in an NIH style mock review session. Other topics related to response to critique and the development of a scientific career will be included. Prerequisite: BBSC Ph.D. student or instructor consent required. (3-0) Y

**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 6323 (ACN 6323) Neurophysiology (3 semester credit hours) This course focuses on the elements of neural functions ranging from the kinetics of channels in excitable membranes to the collective behavior of real neural networks. Prerequisites: (ACN 6340 or HCS 6340) and department consent required. (3-0) Y

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 language, memory, social cognition, and learning. 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, neuropsychological and cognitive neuroscience 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 consideration of automatic and controlled processes, the time course of perceptual processing, and the role of working memory. (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) A detailed study of neural physiology and the 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 6342 Research Methods and Professional Development in Neuroscience (3 semester credit hours) The goal of this course is to familiarize PhD students in Neuroscience with basic statistical analysis tools that are used in most rodent animal studies. Another goal is for students to learn how to present statistical
analysis plans for rigor and reproducibility portions of grants and other projects. Another goal of the course is to familiarize students with how to raise funding for scientific projects. A focus will be on NIH funding, but we will cover fellowship grants, R-level grants, and SBIR/STTRs. Students will be required to write aims pages for proposed projects and to give presentations to their fellow students. A final goal of the course will be to work on general aspects of professional development in neuroscience. We will discuss pursuing postdoctoral and faculty and industrial positions and also discuss developing ideas that can lead to startup companies. Prerequisites: BBS majors only and department consent required. (3-0) Y

HCS 6343 (ACN 6345) 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 reviews 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) Vector calculus, Radon-Nikodym density functions, vector calculus-based probability theory, Markov chains, and Markov random fields with machine learning and artificial neural network modeling applications. Emphasizes applications of theory to unsupervised, supervised, and reinforcement learning machines and deep learning. This course is a required prerequisite for ACN 6349 and HCS 6349. Prerequisites: Linear algebra and calculus and (STAT 3341 or equivalent) and department consent required. (3-0) T

HCS 6349 (ACN 6349) Statistical Machine Learning (3 semester credit hours) Mathematical tools for investigating the asymptotic behavior of both batch and adaptive machine learning algorithms including the 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 theory to unsupervised, supervised, and reinforcement learning machines and deep learning. Prerequisites: (ACN 6348 or HCS 6348) 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) Developmental milestones of 24-to 60-month olds across several domains, the mechanisms of developmental change, individual differences in development, social influences on development, and the practical applications of research on early child development. Prerequisites: BBSC
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) Y

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) Covers the anatomical and physiological basis for the use of electrophysiological techniques in the surgical operating room, modalities that are utilized, and surgical procedures that are monitored. Prerequisite: BBSC majors only. (3-0) Y

HCS 6374 (ACN 6374) Intraoperative Neurophysiological Monitoring (IONM) Part II (3 semester credit hours) Covers recordings of neuro-electric brain potentials and their interpretation during high-risk surgical procedures and clinically for diagnostic and therapeutic purposes. The use of various neurophysiological methods for guiding implantation of stimulating electrodes deep in the brain and for assisting the surgeon in certain operations are also described. This course will cover an understanding of the various IONM techniques for different surgical procedures, including the brain, spine, and peripheral nerve surgeries. Students will be exposed to the basics and advance knowledge of neurophysiological monitoring techniques. IONM Part II, focusing on the national professional competencies, professional standards of practice, and evidence-based theory, is presented. The students will also learn to utilize research skills to explore the latest protocols and standards of practice. This course is second in two-part sequence to prepare the students for the Certification in Intraoperative Neurophysiological Monitoring (CNIM) examination administered by ABRET. IONM Part II is a very interactive course, and the students are expected and encouraged to participate in class discussions. Prerequisite: ACN 6373 or HCS 6373. (3-0) Y

HCS 6375 (ACN 6375) IONM Special Topics (3 semester credit hours) Special topics in the area of Intraoperative Neurophysiological Monitoring (IONM). May be repeated for credit as topics vary. Prerequisites: ACN 6373 or HCS 6373 or ACN 6374 or HCS 6374 or instructor consent) and BBSC majors only. (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 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. No computer programming prerequisites but students will learn MATLAB programming. 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. Lab fee of $30 required. Prerequisites: BBSC majors only and department consent required. (0-9) T

**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: Functional Localization (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). Prerequisite: ACN 6313 or HCS 6313 or PSYC 6313 or instructor 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 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 7324** Seminar in Language Science (3 semester credit hours) This course is designed to acquaint Ph.D. students with central theoretical issues and methodological approaches in Language Science. Students will engage with a range of current theoretical models and methodologies. The goal is to ensure that students can apply relevant constructs and methods from Language Science to their own multidisciplinary programs of research in speech, language, and hearing. Prerequisite: BBSC Ph.D. student or instructor consent required. (3-0) T

**HCS 7325** Seminar in Speech Science (3 semester credit hours) This course is designed to acquaint Ph.D. students with central theoretical issues and methodological approaches in Speech Science. Students will engage with a range of current theoretical models and methodologies. The goal is to ensure that students can apply relevant constructs and methods from Speech Science to their own multidisciplinary programs of research in speech, language, and hearing. Prerequisite: BBSC Ph.D. student or instructor consent required. (3-0) T

**HCS 7326** Seminar in Hearing Science (3 semester credit hours) This course is designed to acquaint Ph.D. students with central theoretical issues and methodological approaches in Hearing Science. Students will engage with a range of current theoretical models and methodologies. The goal is to ensure that students can apply relevant constructs and methods from Hearing Science to their own multidisciplinary programs of research in speech, language, and hearing. Prerequisite: BBSC Ph.D. student or instructor consent required. (3-0) T

**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 7343 (ACN 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
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) T

HCS 7354 (COMD 7354) Neural Basis of Music and Language (3 semester credit hours) Music and language are integral and universal components of human nature, as proven by their ubiquity across all cultures. There is a growing body of evidence indicating connections between music and language abilities. The advent of state-of-the-art neuroscience technology allows us to study the relations more systematically at the neural level. This course is designed to offer a general overview of the neuroscience of speech, language, and music, a glimpse of research in this emerging discipline, and a sample of the wide variety of current and possible applications for speech/language interventions of clinical and aging populations. The course does not require a background in neuroscience. Prerequisite: BBSC majors only or instructor consent required. (3-0) R

HCS 7355 Seminar in Psychology (3 semester credit hours) Selected topics of current research in developmental, cognitive, or social psychology. 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, Anxiety, and other Emotions: 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. (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. The organization of motor systems, pain circuits, and sensory systems are also included in the course. 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) 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 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 Speech, Language, and Hearing Sciences (1-6 semester credit hours) Selected topics and current research in speech, language, and hearing sciences. 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 Psychology (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 Speech, Language, and Hearing Sciences (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 Psychology (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 Speech, Language, and Hearing 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 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 Psychology (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 Speech, Language, and Hearing 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 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**
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>HDCD 5350</td>
<td>Introduction to Child Life (3 semester credit hours)</td>
<td>(3-0) Y</td>
<td>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.</td>
</tr>
<tr>
<td>HDCD 6310</td>
<td>Working with Parents and Caregivers (3 semester credit hours)</td>
<td>(3-0) Y</td>
<td>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.</td>
</tr>
<tr>
<td>HDCD 6312</td>
<td>Atypical Development (3 semester credit hours)</td>
<td>(3-0) Y</td>
<td>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.</td>
</tr>
<tr>
<td>HDCD 6315</td>
<td>Assessment Theory (3 semester credit hours)</td>
<td>(3-0) S</td>
<td>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.</td>
</tr>
<tr>
<td>HDCD 6316</td>
<td>Developmental Assessment (3 semester credit hours)</td>
<td>(3-0) S</td>
<td>Training in administration of play-based, curriculum-based, and specialized development domain assessment tools. Training in use of Zero-to-Three diagnostic classification system (DC: 0-5) for differential diagnosis decision-making. Emphasis on clinical judgment/observation, interpretation, and integration with assessment results. Prerequisites: HDCD 6315 and HDCD 6319 and department consent required.</td>
</tr>
<tr>
<td>HDCD 6319</td>
<td>(HCS 6357 and PSYC 6357) The Developing Child: Infants and Toddlers</td>
<td>(3-0) Y</td>
<td>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 &quot;system&quot; within the relationships. Prerequisites: BBSC majors only and department consent required.</td>
</tr>
<tr>
<td>HDCD 6320</td>
<td>(HCS 6359 and PSYC 6320) The Developing Child: Toddler and Preschool Years</td>
<td>(3-0) Y</td>
<td>Developmental milestones of 24-to 60-month olds across several domains, the mechanisms of developmental change, individual differences in development, social influences on development, and the practical applications of research on early child development. Prerequisites: BBSC majors only and department consent required.</td>
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<tr>
<td>HDCD 6330</td>
<td>Families and Culture (3 semester credit hours)</td>
<td>(3-0) R</td>
<td>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.</td>
</tr>
</tbody>
</table>
| 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 inter-
vention 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)
Examines the typical developmental trajectory of social cognition and social-communication in the first two
years of life, and assessment/intervention strategies for identifying and treating children with social
communication problems. The course is divided into two main sections. The first section focuses on the
three major components of Evidence-Based Practices (E3BP): scientific evidence; individual characteristics;
and professional expertise. The second section focuses on functional evaluation of social communication in
prelinguistic and emerging language children. 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) 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) Infant Mental Health is a global field of study
that examines the healthy development of children ages 0 - 3 years. This course discusses theoretical
foundations within the context of relationships that support early child development. Self-reflection is a
primary practice through the duration of this course and class activities are designed to provide this
opportunity. Content discussion includes infant brain development, temperament, early childhood trauma,
attachment and separation, and parent attachment styles. The course text identifies intervention programs
and early childhood disorders which are also highlighted in this course. 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. ([1-9]-0) Y

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 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 6320 (HCS 6359 and HDCD 6320)** The Developing Child: Toddler and Preschool Years (Two to Five Years) (3 semester credit hours) Developmental milestones of 24-to 60-month olds across several domains, the mechanisms of developmental change, individual differences in development, social influences on development, and the practical applications of research on early child development. 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 language, memory, social cognition, and learning. 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, neuropsychological and cognitive neuroscience perspectives. Prerequisites: BBSC majors only and department consent required. (3-0) R

**PSYC 6335 (HCS 7376 and HDCD 6385)** Child Psychopathology (3 semester credit hours) 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 6352** Cognitive Psychology Essentials for Cyber Security (3 semester credit hours) Cybersecurity
involves human judgment and action both on the attack and defense sides. This course is an introduction
to the human-side of cyber security. It will provide an in depth overview of the scientific study of the mind
and the mental processes involved in cyber-defense as well as cyber-attack. The course begins with an
examination of the different cognitive processes that are important for effective cyber security. These
include perception, attention, working memory, and long term memory. We next focus on different forms of
reasoning and decision making relevant to interactions in cyberspace. These include inductive, deductive,
analogical, and abductive reasoning. Lastly, we will consider how human judgment, heuristics, biases,
expertise and social/group problem solving affect human performance. We will also consider the relevance
of technology characteristics and human-computer interaction methods. These topics will all be covered
from both a cyber-attack and a cyber-defense position to provide a thorough understanding of the possible
mindset, motive, and capabilities of an attacker and how best to implement defense methods. The focus
throughout will be on current research and theory in this rapidly evolving field. Department consent
required. (3-0) R

**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 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