

Course Descriptions

Proseminars

HCS 6302 Issues in Behavioral and Brain Sciences - Part I (3 semester hours)
Doctoral proseminar on current theory and research in Cognition and Neuroscience, Communication Sciences and Disorders, and Psychological Sciences. Pass/Fail only. (Open only to HCS doctoral students) (3-0) Y

HCS 6303 Issues in Behavioral and Brain Sciences - Part II (3 semester hours)
Continuation of the doctoral proseminar on current theory and research in Cognition and Neuroscience, Communication Sciences and Disorders, and Psychological Sciences. Pass/Fail only. (Open only to HCS doctoral students) (3-0) Y

Research Methods Courses

HCS 6312 (ACN 6312) Research Methods in Behavioral and Brain Sciences - Part I (3 semester hours) Applying, understanding, and interpreting various statistical techniques in behavioral science context. Participants have the opportunity to learn appropriate statistical details for basic descriptive and inferential statistics, the interrelationships among 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 HCS 6312. (3-0) Y

HCS 6313 (ACN 6313) Research Methods in Behavioral and Brain Sciences - Part II (3 semester hours) Topics in general linear modeling including regression analysis correlation, simple analysis of variance, factorial analysis of variance, analysis of covariance, between and within subject designs, and multiple regression. Prerequisite: HCS 6312 or consent of instructor. (3-0) Y

HCS 6314 Instrumentation (3 semester hours) Basic principles of electricity, signal processing, instrumentation, and laboratory safety. (3-0) R

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

HCS 6390 Evaluation Research Methods in Behavioral and Brain Sciences (3 semester hours) A review of research methods used in evaluation research, with consideration given to public, private, and nonprofit programs. Issues to be addressed include research design, appropriate performance standards, measurement and selection of indicators, sampling, data collection, and data analysis. (3-0) Y

HCS 6399 Research Ethics and Scientific Integrity (3 semester hours) An interactive, intensive course designed to cover critical issues related to human subjects, animal

welfare, research design, accountability of scientific actions and fraud. Course designed for individuals intending research careers in academia or industry. (3-0) Y

HCS 6V91 Evaluation Research (3-6 semester hours) Individual or group project in evaluation research performed for a public or private organization. Students must have a faculty sponsor who supervises the research project. Students normally enroll for two consecutive semesters. The first semester culminates in the completion of a formal evaluation research proposal; the second ends with a final research report and presentation based on the completed evaluation research. Students must also participate in a weekly seminar on topics in evaluation research, featuring faculty and student presentations, guest speakers, and group discussion. Permission of the Program Coordinator and a faculty sponsor are required. May be repeated for a total of six semester credit hours. (Same as POEC 6V91.) ([3-6]-0) Y

HCS 7310 Advanced Research Methods (3 semester hours) Advanced methods of inquiry and analysis unique to either Cognition and Neuroscience, Communication Sciences and Disorders, or Psychological Sciences. Prerequisite: HCS 6313. (May be repeated for credit.) (3-0) Y

HCS 7312 Applied Research Design (3 semester hours) Formal principles of research design, how to apply these principles to published work and original investigations. (3-0) R

HCS 7314 Research Methods in Behavioral and Brain Sciences—Part III (3 semester hours) Applying, understanding, and interpreting various advanced multivariate statistical techniques in brain and behavioral science contexts. Includes principle component analyses, simple and multiple correspondence analyses, partial least square regression, discriminant analyses, and structural equation modeling. (3-0) R

Cognition and Neuroscience

HCS 5314 (ACN 5314) Cognitive and Neural Modeling Lab (3 semester hours) Auto-associative, associative, competitive learning, recurrent, and back-propagation artificial neural network architectures in a “hands-on” micro-computer laboratory environment using special simulation software. Applications to perceptual, cognitive, computational, and neuroscience modeling problems. Prerequisites: Linear Algebra and Computer Programming Experience is recommended but not required. (3-0) T

HCS 6310 Fundamentals of Functional Brain Imaging (3 semester hours) This course covers topics such as principles of tracer techniques, neuroimaging instrumentation, safety issues, brain physiology (perfusion, metabolism, and receptor function), image processing and analysis, fundamentals of SPECT, PET and fMRI, and critical evaluation of the functional neuroimaging literature. (3-0) Y

HCS 6330 (ACN 6330) Cognitive Science (3 semester hours) Cognitive, computational, and neural processing approaches to understanding perception, memory, thought, language and emotion. (3-0) Y

HCS 6332 (ACN 6332) Perception (3 semester 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) T

HCS 6333 (ACN 6333) Memory (3 semester hours) Research and theory on the

acquisition, representation and retrieval of information by the mind/brain. Includes information processing and neuropsychological perspectives. (3-0) T

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

HCS 6335 Seminar in Auditory Cortical Processing (3 semester hours) Basic principles of neural information processing with special emphasis on the central nervous system processes underlying hearing and speech perception. May be repeated for credit. (3-0) T

HCS 6336 Principles of Developmental Neuroscience (3 semester hours) Molecular and cellular events underlying neuronal differentiation, axon guidance, synapse formation, neurotrophic factors, and neural death, with special emphasis on activity-dependent plasticity and its role in generating and maintaining the extraordinary precision of connections found in the nervous system. (3-0) T

HCS 6337 Seminar in Neural Plasticity and Behavior (3 semester hours) Critical readings from the interfaces between the behavioral neurosciences, biophysics, and biochemistry. Neural mechanisms of learning and memory and of plasticity compensating for peripheral or central nervous system damage are among the topics discussed. May be repeated for credit. (3-0) T

HCS 6340 (ACN 6340) Cellular Neuroscience (3 semester hours) Basic neural biology and physiology and principles of synaptic transmission. (3-0) Y

HCS 6344 Electrophysiology (3 semester hours) Patch-clamp, sharp electrode and extracellular recording techniques are examined in detail, including multi- and single-unit recording, evoked and event-related potentials including recording techniques, and applications of these techniques. Prerequisite: HCS 6346 or consent of instructor. (3-0) T

HCS 6346 (ACN 6346) Systems Neuroscience (3 semester 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. (3-0) Y

HCS 6347 (ACN 6347) Intelligent Systems Analysis (3 semester hours) Mathematical tools for investigating the asymptotic behavior of both deterministic and stochastic nonlinear dynamical systems for the purposes of building computational models in the fields of neuroscience, psychology, and artificial intelligence. Topics include: artificial neural network architectures, Lyapunov stability theory, nonlinear optimization theory, stochastic approximation theory, and the Gibbs Sampler. Prerequisites: HCS 6348 (or equivalent) or consent of instructor. (3-0) T

HCS 6348 (ACN 6348) Neural Net Mathematics (3 semester hours) Vector calculus and vector calculus-based probability theory with artificial neural network modeling applications. Intended to provide mathematics preparation for HCS 6347 and HCS 6349. Prerequisites: Either: (1) Linear algebra, multivariable calculus, STAT 5351, and HCS 5314, or (2) consent of instructor. (3-0) T

HCS 6349 (ACN 6349) Intelligent Systems Design (3 semester hours) Mathematical tools for the design and evaluation of artificially intelligent deterministic and stochastic nonlinear dynamical systems for the purposes of building computational models in the fields of neuroscience, psychology, and artificial intelligence. Topics include: (1) Markov Random Field probability representations, and (2) asymptotic mathematical statistical

theory for: parameter estimation, model selection, and hypothesis testing. Prerequisites: HCS 6347 or consent of instructor. (3-0) T

HCS 6372 Pathophysiology of Disorders of the Nervous System (3 semester hours)

The pathophysiology of disorders such as movement disorders and pain is discussed with emphasis on the role of neural plasticity in causing symptoms and signs. (3-0) Y

HCS 6373 (ACN 6373) Intraoperative Neurophysiological Monitoring I (3 semester hours) The anatomical and physiological basis for the use of electrophysiological techniques in intraoperative neurophysiologic monitoring and in diagnosis of disorders affecting the nervous system. (3-0) Y

HCS 6374 (ACN 6374) Intraoperative Neurophysiological Monitoring Part II (3 semester hours) The use of recordings of neuro-electric brain potentials and their interpretation for diagnostic purposes and for intraoperative monitoring. Prerequisite: HCS 6373 (ACN 6373) (3-0) Y

HCS 7315 Statistical Analysis of Brain Imaging Data (3 semester hours) Covers analysis of brain imaging data obtained from diverse techniques such as PET, SPECT, fMRI, or EEG. Includes “standard analyses” with packages such as SPM02 or AFNI as well as pattern analyses approaches (e.g., partial least squares regression, correspondence, discriminant, and principal component analyses). (3-0) R

HCS 7322 (ACN 7322) Computational Models of Language Understanding (3 semester hours) Probabilistic methods for natural language understanding. Use of the MATLAB computer language for instantiating specific knowledge-based computational theories of natural language understanding . Prerequisites: Computer Programming Experience is recommended but not required. (3-0) T

HCS 7329 Functional Brain Imaging Practica (3 semester hours) This course applies learned skills to short research projects in a small group format. Projects include: 1) acquisition of new data in SPECT, PET or fMRI in association with ongoing funded research sponsored by various faculty at UTSW or UTD; 2) mentored analysis of existing data sets from these sources; and 3) experimental design projects in which more advanced trainees will develop a full experimental protocol, including informed consent procedures, acquisition parameters and data analysis plans. All projects are reviewed in a biweekly group meeting to facilitate learning across groups. (3-0) Y

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

HCS 7333 (ACN 7335) Computational Neuroscience (3 semester hours) Construction of biologically realistic simulations of neurons and small neural circuits using state-of-the-art simulation software. Students will construct simulations that shed light on the neural basis of higher functions such as visual contrast enhancement, perceptual oscillation, sensory localization, and motor pattern generation. (3-0) R

HCS 7343 (ACN 7343) Neuropharmacology (3 semester 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.

Prerequisite: HCS 6340 or HCS 6346. (3-0) T

HCS 7344 (ACN 7344) Functional Human Neuroanatomy (3 semester hours)

Function of each major brain system as related to the organization and synaptic connections of their principal nuclei. Function of each system related to the neurological disorders associated with disease or lesions at specific locations. (3-0) T

HCS 7345 (ACN 7345) Neuroanatomy Laboratory (3 semester hours) Laboratory experience with neural tracing techniques employed in neuroscience research.

Prerequisite: HCS 7344 or consent of instructor. (0-3) T

HCS 7349 Text Comprehension Seminar (3 semester hours) Current readings in the field of text comprehension and memory. May be repeated for credit with instructor's permission. (3-0) R

HCS 7351 Aging and the Nervous System (3 semester 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. (3-0) R

HCS 7372 Seminar in Cognition and Neuroscience (3 semester hours) Selected topics and current research in cognition and neuroscience. (May be repeated for credit.) (3-0) R

HCS 7378 (ACN 7378) Advanced Neurophysiology Methods (3 semester hours)

Hands-on experience with deeply anesthetized and reduced in vitro brain slice or dissociated cell preparations widely used in neuroscientific research. Satisfies the Measurement and Evaluation (Master's) or advanced Methods (Doctoral) requirement.

Prerequisite: HCS 6340 or HCS 6346 and consent of instructor. (3-0) R

Communication Sciences and Disorders

HCS 6367 Speech Perception (3 semester 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. (3-0) T

HCS 6368 Language Development (3 semester hours) Advanced study of normal oral language development. Focus on research in child language and recent theories of language acquisition. Prerequisite: Consent of instructor. (3-0) Y

HCS 6369 Brain Mechanisms in Hearing (3 semester hours) Neuroanatomical and neurophysiological bases of stimulus processing in the auditory neuraxis. (3-0) R

HCS 6379 Neurological Basis of Language Development (3 semester hours) Study of the developing brain and how it relates to the acquisition and development of language throughout the lifespan. (3-0) R

HCS 6391 Seminar on Preliteracy Development (3 semester hours) Selected topics and current research in preliteracy development (May be repeated for credit). (3-0) R

HCS 6392 Seminar in Theories of Language Acquisition (3 semester hours) A survey and critical exploration of current theories of language acquisition and more general theories of cognitive development that have been applied to language development. (3-0) R

HCS 7339 Psycholinguistics (3 semester hours) Classic and current research in psycholinguistics. Includes concepts from linguistics, the biological bases of speech and language processing, and child language acquisition. Hands-on exercises include labs on

speech perception, language acquisition, and language comprehension. (3-0) R

HCS 7352 Seminar in Language Impairments in Children (3 semester hours)

Advanced study of language impairments in children emphasizing research issues related to these diverse clinical populations. Topics may include SLI, SCI, SELD, deafness, autistic spectrum disorders among others. May be repeated for credit. Prerequisites: COMD 6307 or HCS 6368 and COMD 7378 or consent of instructor. (3-0) T

HCS 7367 (ACN 7367) Speech Perception Laboratory (3 semester hours)

Introduction to the field of speech processing by computer, with primary application to research techniques in the study of speech perception. (0-9) T

HCS 7368 Speech Production Development (3 semester hours) Foundations of speech production development including anatomic, physiologic, acoustic, and psycholinguistic bases. (3-0) R

HCS 7V71 Seminar in Communication Sciences and Disorders (1-6 semester hours)

Selected topics and current research in communication sciences and Disorders. (May be repeated for credit.) ([1-6]-0) R

HCS 7379 Current Research in Autism (3 semester hours) Advanced seminar addressing current issues in the field of autism; topics vary and may include various theoretical approaches to autism, diagnosis and assessment of children with autism, and affective reciprocity in both typically developing children and children with autism. (May be repeated for credit with consent of the instructor.) (3-0) R

Psychological Sciences

HCS 6326 Infant Perception (3 semester hours) Research, theoretical issues, and experimental paradigms in infant perception, including topics such as face and speech perception. (3-0) R

HCS 6327 Personality (3 semester hours) Survey of cognitive, analytic, and learning theory approaches to study of personality. Emphasis on intensive exploration of selected concepts and related research (3-0) R

HCS 6331 (HDCD 5304) Cognitive Development (3 semester hours) Survey of cognitive development theories and research in a variety of domains including perception, memory, language, and problem solving. (3-0) Y

HCS 6350 Social Development (3 semester hours) Foundations of social and personality development. Includes survey of psychodynamic, social learning, behavior genetic, family systems, and social-cognitive approaches to the study of attachment, parenting, aggression, peer relationships, sex typing, and other contemporary issues. (3-0) Y

HCS 6352 Individual Factors in Human Development (3 semester hours)

Contemporary theory and research in personality and social psychology. (3-0) R

HCS 6354 Social Cognition (3 semester hours) The influence of cognition as a determinant of social behavior with particular focus on social perception, attributions, and attitudes. (3-0) R

HCS 6356 (HDCD 5312) Atypical Development (3 semester hours) Disorders of development from conception to age three, emphasizing etiology symptoms, diagnosis and treatment. Impact of delays in the acquisition and integration of various

developmental skills as they relate to specific disorders of sensory and motor skills, language and cognition, and personality and socialization. (3-0) Y

HCS 6358 Affective Development (3 semester hours) Theory and research on emotions and emotional development. Includes perspectives on the links between emotions, socialization and behavior, and marital and family processes and emotion regulation. (3-0) R

HCS 6375 Development of Social Cognition (3 semester hours) Combines methods from developmental, social, and cognitive psychology to examine how children and adults perceive and interpret information in their social worlds. Explores social cognition from infancy (e.g., imitation, joint attention) through childhood (e.g., perspective taking, theory of mind) and adulthood (e.g., social judgments, biases). (3-0) R

HCS 6376 Social Psychology (3 semester hours) Overview of the social bases of behavior. Topics include social cognition and self justification, biases in judgment, attitudes and persuasion, conformity, compliance, and 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. (3-0) Y

HCS 6395 (ACN 6395) Cognitive Psychology (3 semester hours) Theory and research on perception, learning, thinking, psycholinguistics, and memory. Prerequisites: CGS 3361 (PSY 3361) or consent of instructor. (3-0) Y

HCS 7331 Relationships and Development (3 semester hours) Theory and research on relationship processes involved in development. Topics include parent-child and parent-adolescent relations, sibling relations, peer and friendship relations, romantic relationships, and marital/couple relations. Linkages among relationships are also emphasized. (3-0) R

HCS 7332 Adult Psychopathology (3 semester hours) Theory and research on the origins, classification, and treatment of psychological disorders of adulthood, with consideration of whether these disturbances exist on continua with normal behavior. Critical examination of diagnoses, with an emphasis on how scientific research can guide our understanding of etiology and treatment (3-0) R

HCS 7355 Seminar in Psychological Sciences (1-6 semester hours) Selected topics of current research in social or cognitive development. (May be repeated for credit.) (3-0) R

HCS 7374 Peer Relationships and Interpersonal Competence (3 semester hours) Theory and research on children's and adolescents' peer groups, friendships, and romantic relationships, as well as the social skills that are called for in these relationships. (3-0) R

HCS 7376 Child Psychopathology (3 semester hours) Major classes of childhood psychopathology manifested during infancy through adolescence. Normal personality development as a basis for identifying psychopathology. Issues of etiology, diagnosis, prognosis and social policy. (3-0) Y

Other Courses

HCS 7380 Practicum in Communication Sciences (3 semester hours) Supervised research or practice-based activities in applied contexts or evaluation and therapeutic

management of communication disorders. Weekly conference may be required. Pass/Fail only. (May be repeated for credit) (3-0) S

HCS 7V98 Directed Individual Study in Behavioral and Brain Sciences (1-9 semester hours) Individualized program of study which may include reading, research, implementation of clinical strategies, and/or other designated activities. (May be repeated for credit) (0-3/0-27) S

HCS 8V50 Doctoral Readings and Research Seminar (1-6 semester hours) Seminar for advanced doctoral students on current issues and research in Behavioral and Brain Sciences. (May be repeated for credit) ([1-6]-0) S

HCS 8V80 Research in Behavioral and Brain Sciences (1-9 semester hours) Supervised research and readings. (May be repeated for credit.) (0-9/0-27) S

HCS 8V99 Dissertation (3-9 semester hours) (May be repeated for credit.) (0-9/0-27) S