Cognitive Science

**CGS 2301** Cognitive Science (3 semester credit hours) An introduction to the study of the brain and behavior from the point of view of cognitive science, including approaches from psychology, philosophy, neuropsychology, and computational modeling. Includes phenomena involving sensory systems, memory, decision making, language, and communication. (3-0) Y

**CGS 3325** Historical Perspectives on Psychology: Mind and Machines since 1600 (3 semester credit hours) Basic frames of reference in twentieth century psychology and their historical development in Western thought since 1600 with an emphasis on issues involved with minds, brains, and machines. Includes behaviorism, learning theory, artificial intelligence, and gestalt, structural and cognitive approaches. Prerequisite: **PSY 2301** or **CGS 2301**. (Same as **PSY 3360**) (3-0) Y

**CGS 3340** Experimental Projects in Cognitive Science (3 semester credit hours) Laboratory and field experience in designing and conducting research, with a major emphasis on writing research reports. Credit cannot be received for more than one of the following: **CLDP 3394**, **CLDP 3494**, or (**PSY 3393** or **CGS 3340**). Prerequisite: **PSY 3392** or **PSY 3490**. (Same as **PSY 3393**) (3-0) S

**CGS 3342** Cognitive and Neural Modeling Laboratory (3 semester credit hours) A historical introduction to the major classes of supervised, unsupervised, and reinforcement machine learning algorithms from a behavioral science and neuroscience perspective with applications to artificial intelligence, computational neuroscience, and mathematical psychology. Students study the behavior of these algorithms within the MATLAB simulation modeling environment. (3-0) T

**CGS 3361** Cognitive Psychology (3 semester credit hours) Theory and research on perception, learning, thinking, psycholinguistics, and memory. Prerequisite: **CGS 2301** or **PSY 2301**. (Same as **PSY 3361**) (3-0) S

**CGS 4312** Computational Modeling Methods for Language Understanding (3 semester credit hours) Probabilistic-based methods for developing machine learning algorithms that support text mining using both the PERL and MATLAB. Topics include latent semantic analysis, hidden Markov models, and knowledge ontologies. (3-0) R

**CGS 4313** Neural Net Mathematics (3 semester credit hours) Advanced matrix calculus and vector calculus-based probability theory with applications to problems in machine learning and artificial neural network modeling. Intended to provide mathematics preparation for **CGS 4314** or **CS 4314** and **CGS 4315** or **CS 4315**. Includes introduction to gradient descent type unsupervised, supervised, and reinforcement learning algorithms as well as iterative constraint satisfaction algorithms. Prerequisites: (**MATH 2414** or **MATH 2419**) and (**STAT 3341** or **STAT 4351**) and **MATH 2418**. (Same as **CS 4313**) (3-0) T

**CGS 4314** Intelligent Systems Analysis (3 semester credit hours) This course covers mathematics essential for the mathematical analysis and design of unsupervised, supervised, and reinforcement machine learning algorithms including Neural Network learning machines within a statistical empirical risk minimization framework. Course topics include: advanced vector and matrix calculus, stochastic sequences of mixed random vectors, and the Markov random field factorization theorem with explicit machine learning applications and examples. Prerequisite: **CGS 4313** or instructor consent required. (Same as **CS 4314**) (3-0) T

**CGS 4315** Intelligent Systems Design (3 semester credit hours) Mathematical analysis of behavior and generalization performance of deterministic batch and stochastic adaptive learning algorithms within a statistical empirical risk minimization framework. Topics include:
Convergence analysis of batch learning algorithms, convergence analysis of adaptive learning algorithms, Comte Carlo Markov Chain inference and sampling, bootstrap sampling methods, and estimation of generalization performance using asymptotic statistical theory. Unsupervised, supervised, and reinforcement machine learning applications are emphasized throughout the course. Prerequisite: CGS 4313 or instructor consent required. (Same as CS 4315) (3-0) T

CGS 4320 Psychology of Reasoning (3 semester credit hours) This course will examine reasoning from multiple perspectives including types of thinking and reasoning, comparisons across species, and lifespan development. There is a joint emphasis on the definition of reasoning from a cognitive perspective and from a neuroscience perspective. Prerequisite: PSY 2301 or PSY 3361. (Same as PSY 4320) (3-0) Y

CGS 4352 Human Computer Interactions I (3 semester credit hours) Methods and principles of human-computer interaction (HCI), user-centered design (UCD), and usability evaluation. Provides broad overview of HCI and how HCI informs UCD processes throughout product development lifecycle. (Same as CS 4352) (3-0) T

CGS 4353 Human Computer Interactions II (3 semester credit hours) Detailed exploration of human-computer interaction (HCI) through readings in journal articles and research reports. Practical experience in methodology typically used in the design of usable systems. (Same as CS 4353) (3-0) T

CGS 4359 Cognitive Neuroscience (3 semester credit hours) Examines how modern cognitive neuroscientists explore the neural underpinnings of perception, memory, attention, language and emotion. Investigates how the brain-bases of these functions are uncovered by ingenious observations of clinical populations (including brain-damaged and schizophrenic patients), animal and human electrophysiological techniques, and powerful new functional neuroimaging tools. Prerequisite: PSY 2301. (Same as NSC 4359 and PSY 4359) (3-0) S

CGS 4362 Perception (3 semester credit hours) Considers the processes by which the individual gathers information from the external world, the physiological basis of those processes, and how they develop throughout the life span of the individual. Prerequisite: CGS 2301 or PSY 2301. (Same as PSY 4362) (3-0) R

CGS 4364 Attention and Memory (3 semester credit hours) Factors influencing the capacity to pick up, organize, and remember complex information. Prerequisite: (CGS 3361 or PSY 3361) or instructor consent required. (Same as PSY 4364) (3-0) R

CGS 4385 Neuropsychology (3 semester credit hours) This course is a comprehensive introduction of the relationship between brain and behavior. Topics include the foundations of neuropsychology, the brain's organization and functional systems, and neuropsychological perspectives of memory, attention, language, emotion, and spatial functions, and their related disorders. Prerequisite: NSC 3361. (Same as NSC 4385 and PSY 4385) (3-0) Y

CGS 4386 Adult Development and Aging (3 semester credit hours) This course is designed to provide an overview of theories, methods, and research on the psychological processes during adulthood and aging. A selection of topics will be covered to understand the nature of and multiple influences on development throughout the adult lifespan. Prerequisite: PSY 2301. (Same as PSY 4386 and SPAU 4386) (3-0) Y

CGS 4389 Developmental Cognitive Neuroscience (3 semester credit hours) Course examines how the human brain develops and changes throughout childhood to support a range of essential cognitive processes. The course will include the following topics: the development of the neuronal structures underlying imperative cognitive processes including: vision, attention, social cognitive, memory, language, and planning; how genetic and environmental factors interact to shape brain networks underlying human behavior; methods for studying cognitive neuroscience across the lifespan, including fMRI, EEG, rTMS, and DTI; and neuroplasticity and the changing brain throughout development. Prerequisite: PSY 2301. (Same as CLDP 4389 and
**NSC 4389** and **PSY 4389** (3-0) Y

**CGS 4390** Directed Research and Writing (3 semester credit hours) Student conducts research under weekly faculty supervision and completes assigned laboratory projects and written activities with feedback. May be repeated for credit as topics vary (9 semester credit hours maximum for **CGS 4390** and **CGS 4V98** combined). Instructor consent required. (3-0) S

**CGS 4391** Writing and Independent Study (3 semester credit hours) Student studies advanced topics under weekly faculty supervision and completes assigned readings, independent readings, and written paper. May be repeated for credit as topics vary (6 semester credit hours maximum for **CGS 4V99** and **CGS 4391** combined). Instructor consent required. (3-0) S

**CGS 4394** Internship in Cognitive Science (3 semester credit hours) Students earn course credit for field experience in an applied setting. Requires working at least 8 hours per week at an approved community agency or business of the student's choice. Students keep daily job diaries, attend one class meeting per month, and write brief papers relevant to their experiences. Open to students in good academic standing with a GPA of at least 2.500 who have reached junior or senior standing (more than 53 hours). Apply for placements on the BBS website. Credit/No Credit only. Instructor consent required. (Same as **CLDP 4394** and **NSC 4394** and **PSY 4394** and **SPAU 4396**) (3-0) S

**CGS 4395** Co-op Fieldwork (3 semester credit hours) Students earn course credit for field experience in an approved business or government setting. Requires working at least 8 hours per week. Students will keep a journal of their workplace experience, maintain contact with the instructor, and prepare a written report that focuses on the accomplishments and insights gained through their co-op experience. Open to students in good academic standing with a GPA of at least 2.500. Credit will not be awarded retroactively. Apply for placements through the Career Center office. Credit/No Credit only. May be repeated for credit (6 semester credit hours maximum). Instructor consent required. (Same as **CLDP 4395** and **PSY 4395**) (3-0) S

**CGS 4397** Thesis Research (3 semester credit hours) An independent study in which the student writes a thesis under faculty supervision. Instructor and Associate Dean consent required. (3-0) S

**CGS 4V75** Honors Seminar (1-3 semester credit hours) A course for students enrolled in the BBS Honors Program (minimum 3.500 GPA and 30 graded hours at UT Dallas) who will conduct undergraduate thesis research in BBS. The seminar addresses issues related to research activities. This course is required for students seeking BBS School Honors. Offered only in spring semester. Credit cannot be received for more than one of the following: **CGS 4V75**, **CLDP 4V75**, **NSC 4V75**, **PSY 4V75** or **SPAU 4V75**. Director of the Honors Program consent required. ([1-3]-0) Y

**CGS 4V90** Special Topics in Cognitive Science (1-3 semester credit hours) May be repeated for credit as topics vary (9 semester credit hours maximum). ([1-3]-0) R

**CGS 4V96** Teaching Internship (1-3 semester credit hours) Students work individually with faculty member in preparing and presenting course materials and tutoring students. Must have completed the relevant course with a grade of at least B and have a UT Dallas GPA of at least 3.000. Credit/No Credit only. May be repeated for credit (6 semester credit hours maximum). Instructor and Associate Dean consent required. ([1-3]-0) S

**CGS 4V98** Directed Research (1-3 semester credit hours) Student assists faculty with research projects or conducts a research project under weekly faculty supervision. Credit/No Credit only. May be repeated for credit as topics vary (9 semester credit hours maximum for **CGS 4390** and **CGS 4V98** combined). Instructor consent required. ([1-3]-0) S

**CGS 4V99** Individual Study (1-3 semester credit hours) Student studies advanced topics under weekly faculty direction. Credit/No Credit only. May be repeated for credit as topics vary (6 semester credit hours maximum for **CGS 4V99** and **CGS 4391** combined). Instructor consent required. ([1-3]-0) S

https://catalog.utdallas.edu/2019/undergraduate/courses/cgs