School of Human Development

The School of Human Development at The University of Texas at Dallas offers majors in Cognitive Science, Neuroscience, Psychology, and Speech-Language Pathology and Audiology.

In Cognitive Science, students study human information processing - perception, memory, thought, and decision making - from a perspective that emphasizes computer-based neural network models of those processes in the brain and behavior.

The Neuroscience program provides students the opportunity to study the nervous system from a multidisciplinary approach that combines the study of brain structure, biochemistry, and physiology, and their links to behavior.

The Psychology program provides basic training in the study of mind and behavior as preparation for graduate training in psychology and related fields, as well as providing courses which may be relevant to employment in personnel work or research support positions.

The Speech-Language Pathology and Audiology program offers study in the processes and disorders of speech, language and hearing. The program provides the foundation for graduate work leading to careers as a speech-language pathologist or audiologist. Students meeting B.S. degree and clinical practicum requirements are eligible for Texas state licensure as a speech-language pathology assistant.

The School of Human Development offers a number of services and programs for students. Contact the College Master's office for more information.

The school provides a number of Advising and Mentoring services for students, including professional Academic and Career Advising along with Faculty and Peer Mentors. The Career Paths Program helps students establish their own career paths. It integrates career exploration, individualized career planning, internships, preparation for graduate school and post-graduation placement. Students should sign up for the program in the College Master's office and watch for scheduled talks, workshops and fairs. The school Internship Placement Program is open to all students who have reached junior or senior standing (more than 53 hours). Students earn course credit for working 8 hours per week at an approved community agency of their choice. The program has over 50 established placement sites. Students keep daily job diaries, attend one class meeting per month, and write brief papers relevant to their experiences.

The School Honors Program provides eligible students with opportunities for in-depth experience in research and writing, while working individually with members of the faculty. These opportunities enhance preparation for graduate school and employment in the student's chosen field. To enter the program, students must have junior class standing, have taken at least 24 hours including two core courses in the major from U.T. Dallas, and have at least a 3.4 grade point average. The Honors Program includes a Fall Honors Seminar and the completion of the Honors Thesis.

Cognitive Science (B.S.)

Cognitive science is the study of complex information processing in humans and machines and includes the multidisciplinary study of biological and artificial systems. The field of cognitive science draws from diverse approaches to understanding these processes, including research from experimental psychology, neuroscience, linguistics, computer science, mathematics, and engineering. Cognitive scientists believe that the design of artificially intelligent computer systems can benefit from a better understanding of human psychology and neuroscience. Likewise, our understanding of human thought and behavior can benefit from the latest advances in work on artificially intelligent systems.
The Cognitive Science major prepares students for further study in graduate school leading to professional careers in academic and industrial settings. When coupled with advanced training in math and computer science, the degree prepares the student for the application of computer simulations of neural networks to problems such as pattern recognition and decision making in industry.

Bachelor of Science in Cognitive Science Degree Requirements (120 hours)

I. Core Curriculum Requirements\(^1\): 42 hours

A. Communication (6 hours)
   - 3 hours Communication (RHET 1302)
   - 3 hours Communication Elective (CGS 3340 or PSY 3393)\(^2\)

B. Social and Behavioral Sciences (15 hours)
   - 6 hours Government (GOVT 2301 and 2302)
   - 6 hours History (HST 1301 and 2301)
   - 3 hours Social and Behavioral Science Elective (PSY 2301)\(^2\)

C. Humanities and Fine Arts (6 hours)
   - 3 hours Fine Arts (AP 1301)
   - 3 hours Humanities (A&H 1301)

D. Mathematics and Quantitative Reasoning (6 hours)
   - 6 hours Calculus (MATH 2417 and 2419)\(^3\)

E. Science (9 hours)
   - 3 hours Science (NSC 4361)\(^2\)
   - 6 hours Science Electives (including at least one course with a substantial laboratory component)

\(^1\) Curriculum Requirements can be fulfilled by other approved courses from accredited institutions of higher education. The courses listed in parentheses are recommended as the most efficient way to satisfy both Core Curriculum and Major Requirements at U.T. Dallas.

II. Major Requirements: 44 hours

Major Preparatory Courses (12 hours beyond Core Curriculum)
   - CGS 2301 Cognitive Science
   - CS 1315 Computer Science I
   - MATH 2417 Calculus I \(^3\)
   - MATH 2418 Linear Algebra
   - MATH 2419 Calculus II \(^3\)
   - PSY 2301 Introduction to Psychology \(^2\)

Major Core Courses (16 hours beyond Core Curriculum)
   - CGS 3325 Historical Perspectives: Mind and Machines Since 1600
   - CGS 3340 Empirical Methods in Cognitive Science\(^2\) or PSY 3393 Experimental Projects\(^2\)
   - CGS 3342 Quantitative Models in Cognition
   - CGS 3361 Cognitive Psychology
   - CS 4365 Artificial Intelligence (or other appropriate course approved by the Program head)
   - NSC 4361 Behavioral Neuroscience\(^2\)
   - PSY 3490 Honors Quantitative Methods (may be replaced by PSY 3392 Research Design and Analysis)

Major Related Courses (15 hours)
   - Students are encouraged to take one or more of the following special electives:
     - CGS 4V90 Special Topics in Cognitive Science
     - CGS 4394 Internship in Cognitive Science
     - CGS 4397 Honors Thesis
Students majoring in Cognitive Science must complete 12 additional hours in Cognitive Science and related areas chosen from the following designated electives. The areas serve as examples of possible concentrations, and the student should construct an individualized degree plan in consultation with an advisor. At least 9 semester credit hours should be chosen in one of the areas designated below or in an area approved by a Cognitive Science faculty advisor.

**Human Computer Interaction**

Students specializing in the Human Computer Interaction area obtain skills in designing behavioral and computer software engineering. This area provides excellent preparation for careers associated with the design and evaluation of user-friendly software interfaces. Students electing this option should take CS 2315 Computer Science II and CS 2305 Discrete Math I during their freshman and sophomore years. Students electing this option should take CS 4365 Artificial Intelligence to fulfill the Cognitive Science Core Course requirement. Students should also take:

- CGS 4352 Human Computer Interaction
- CS 3305 Discrete Math II
- CS 3354 Software Engineering
- CS 3345 Algorithm Analysis and Data Structures

And at least one of the following courses:

- PSY 4362 Perception
- PSY 4364 Attention and Memory
- PSY 4374 Judgment and Decision Making

**Intelligent Systems**

Students specializing in the Intelligent Systems area obtain skills in computer programming, mathematical modeling, and intelligent system design and evaluation. This area provides excellent preparation for careers associated with the design and evaluation of intelligent systems. Intelligent systems arise in such diverse areas as the development of web-based intelligent search engines, speech recognition, robotics, pattern recognition, and computer vision. Students electing this option should take the following courses during their freshmen and sophomore years:

- CS 2305 Discrete Math I
- CS 2315 Computer Science II
- MATH 2418 Linear Algebra
- MATH 2419 Calculus II
- MATH 2421 Multivariable Calculus with Applications

Students electing this option should also take CS 4365 Artificial Intelligence to fulfill the Cognitive Science Core requirements, and the following upper division courses:

- CGS 4V90 Intelligent Systems Design I
- CGS 4V90 Intelligent Systems Design II
- CS 3305 Discrete Math II
- CS 3345 Algorithm Analysis and Data Structures
- STAT 4351 Probability

**Cognition and Neuroscience**

The Cognition and Neuroscience specialization provides a multidisciplinary program for preparing students to pursue graduate work in the areas of cognitive psychology and neuroscience. Students electing this option should take at least two courses from the following list:

- NSC 4352 Cellular Neuroscience
NSC 4353 Neuroscience Laboratory Methods  
NSC 4354 Integrative Neuroscience  
NSC 4355 Advanced Neuroscience Laboratory  
NSC 4363 Neuropharmacology  
NSC 4366 Neuroanatomy  
NSC 4367 Developmental Neurobiology  
NSC 4368 Computational Neuroscience  
And at least two of the following courses:  
PSY 3362 Cognitive Development  
PSY 4336 Psychology of Language  
PSY 4357 Brain and Memory  
PSY 4360 Learning  
PSY 4362 Perception  
PSY 4364 Attention and Memory  
PSY 4374 Judgment and Decision Making  

**Language and Speech**  
The Language and Speech specialization provides a multidisciplinary program for preparing students to pursue graduate work in areas such as language and communications disorders. Students electing this option should select at least three courses from the following list:  
LIT 3330 Linguistics  
PSY 4336 Psychology of Language  
SPAU 3303 Normal Language Development  
SPAU 3304 Communication Sciences  
SPAU 3343 Phonetics  
SPAU 3344 Anatomy and Physiology of Speech and Hearing  
SPAU 3345 Neural Basis of Communication  

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2 A required Major course that also fulfills a Core Curriculum requirement. Hours are counted in Core Curriculum.  
3 Six hours of Calculus are counted to fulfill the Mathematics Core Requirement.  

**III. Elective Requirements: 35 hours**  

Advanced Electives (6 hours)  
Breadth Electives; 6 hours of upper-division courses, or lower-division courses that have prerequisites, that are outside of Cognitive Science.  
Free Electives (29 hours)  
Students are encouraged to explore areas of concentration in Cognitive Science as well as explore interests outside the field. Be aware that at least 51 hours of upper division credit hours are required for graduation.  

**Minor in Cognitive Science**  
Students who are not majoring in Cognitive Science may minor in Cognitive Science by taking 18 semester credit hours selected from the lists of major core courses and major related courses. At least 12 hours must be upper-division courses, of which at least 9 hours must be Cognitive Science core courses.  

**Fast Track Baccalaureate/Master's Degrees**  
U.T. Dallas undergraduate students with strong academic records who intend to pursue a master's degree in Applied Cognition and Neuroscience at UTD may consider an accelerated undergraduate-graduate plan of study. When accepted into the program, students may take up to 12 hours of graduate courses that may be used to complete the bachelor's
degree and also to satisfy requirements for the Master's degree. Students must maintain a 3.0 grade point average and earn grades of B or better in the graduate courses taken. The Fast Track makes it possible for students to complete upper-division undergraduate education and graduate training in three years. For admission to the Fast Track program, students must apply and be admitted to the graduate program in Applied Cognition and Neuroscience. Students should consult with a graduate advisor regarding admissions criteria and plans of study.

Specified Course Descriptions

A&H 1301 (HUMA 1301) Exploration of the Humanities (3 semester hours) An introduction to the concept of cultural tradition through the study of selected works of literature, philosophy, music, and visual art. Emphasis on the relations among various forms of cultural expression and developing students' ability to interpret complex artistic works in their historical, cultural, and intellectual contexts. General education core course. (3-0) S

AP 1301 (ARTS 1301) Exploration of the Arts (3 semester hours) This course introduces students to the physical and intellectual demands required of the author, the performer, and the visual artist. This introduction includes, but is not limited to, the student's production of a creative project as well as written assessments of art and performance. (3-0) Y

CGS 2301 Cognitive Science (3 semester 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. Laboratory. Satisfies the Core Curriculum Social and Behavioral Science requirement. (3-3) Y

CGS 3325 Historical Perspectives on Psychology: Mind and Machines since 1600 (3 semester hours) Basic frames of reference in 20th-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, gestalt, structural and cognitive approaches. (Offered in the spring semester.) Prerequisite: PSY 2301 or CGS 2401. (Same as PSY 3360.) (3-0) Y

CGS 3340 Empirical Methods in Cognitive Science (3 semester hours) Laboratory experience in designing and conducting empirical investigations in cognitive science, with a major emphasis on writing research reports. (This course fulfills the advanced writing requirement for Cognitive Science majors and 3 hours of the Communication component of the Core Curriculum). Prerequisite: PSY 3490. (3-0) R

CGS 3342 Quantitative Models in Cognition (3 semester hours) Quantitative approaches to description and theory of phenomena in human cognition, including perception, memory, and thought. Prerequisite: CGS 2401. (3-0) T

CGS 3361 Cognitive Psychology (3 semester hours) Theory and research on perception, learning, thinking, psycholinguistics, and memory. (Offered in the spring semester.) Prerequisite: PSY 2301 or CGS 2401. (Same as PSY 3361.) (3-0) Y

CGS 4394 Internship (3 semester 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 all students who have reached junior or senior standing (more than 53 hours). Apply for placements in the College Master's office. Must be taken on Credit/No Credit basis. (Same as PSY 4394, NSC 4394 and SPAU 4393.) (3-0) S

CGS 4397 Honors Thesis (3 semester hours) An independent study course in which the student writes an honors thesis under faculty supervision. (3-0) S

CGS 4V90 Special Topics in Cognitive Science (1-6 semester hours) May be repeated for credit (9 hours maximum). (3-0) R

CGS 4V98 Research in Cognitive Science (1-6 semester hours) Student assists faculty with research projects or conducts a research project under weekly faculty supervision. Taken on a Credit/No Credit basis unless Program head approves for letter grade. May be repeated for credit. (1-6-0) S

CGS 4V99 Independent Study in Cognitive Science (1-6 semester hours) Student studies advanced topics under weekly faculty direction and writes a paper. Taken for letter grade unless Program Head approves for a Credit/No Credit basis. May be repeated for credit. (1-6-0) S

CS 1315 (COSC 1315) Computer Science I (3 semester hours) Computer programming in a high-level, block structured language. Algorithmic thinking and the history and utility of machines which automate it. Basic data types and variables,
memory usage, control structures (sequential, selection, repetition), functions and parameter passing, recursion, console
and file input/output. Prerequisite: Basic computer literacy/programming skills (see CS 1115 description) or concurrent
enrollment in CS 1115. (3-0) S

CS 2305 (MATH 2419) Discrete Mathematics for Computing I (3 semester hours) Principles of counting. Boolean
operations. Propositional calculus. Sets, relations, functions, strings, languages, partial orders, and lattices. Prerequisite:
MATH 1326 or MATH 2419 or consent of the instructor. (3-0) S

CS 2315 (COSC 2315) Computer Science II (3 semester hours) Advanced programming techniques, including an
introduction to object-oriented programming. Classes, inheritance, dynamic function binding, strings, stacks, queues, lists,
and trees. Dynamic memory allocation/management. Prerequisite: CS 1315. (3-0) S

CS 3305 Discrete Mathematics for Computing II (3 semester hours) Topics in enumeration; principle of inclusion and
exclusion. Algorithmic complexity; recurrence relations. Graph theory. Prerequisite: CS 2305. (3-0) S

CS 3345 Algorithm Analysis and Data Structures (3 semester hours) Metrics for performance evaluation of algorithms.
Formal treatment of basic data structures such as arrays, stacks, queues, lists, trees. Various sorting and searching
techniques. Fundamental graph algorithms. Prerequisites: CS 2315 and CS 3305. (3-0) S

CS/SE 3354 Software Engineering (3 semester hours) Introduction to software life cycle models. Software requirements
engineering, formal specification and validation. Techniques for software design and testing. Cost estimation models. Issues
in software quality assurance and software maintenance. Prerequisites: CS 2315 or CS 3333, and CS 2305 (3-0) S

CS 4365 Artificial Intelligence (3 semester hours) Basic concepts and techniques that enable computers to perform
intelligent tasks. Examples are taken from areas such as natural language understanding, computer vision, machine
learning, search strategies and control, logic, and theorem proving. Prerequisites: CS 2315 and CS 3345. (3-0) Y

GOVT 2301 (GOVT 2301) Constitutional Foundations and Political Behavior in the U.S. and Texas (3 semester hours)
This course examines the evolution and current state of political behavior and public policy making in the U.S. and Texas.
Topics discussed will include the constitutions, federalism, intergovernmental relations, voting, elections, political parties,
public opinion, and interest groups. (Fulfills one-half of the legislative requirement of 6 hours of American government.) (3-0) S

GOVT 2302 (GOVT 2302) Political Institutions in the U.S. and Texas (3 semester hours) This course explores the
primary institutions of U.S. and Texas government. It examines the bureaucracy as well as the executive, legislative, and
judicial branches of government at the state and federal level. (Fulfills one-half of the legislative requirement of 6 hours of
American government.) (3-0) S

HST 1301 Themes and Ideas in American History (3 semester hours) An introduction to the methods of historical inquiry
through the study of selected main themes in American history. A course designed to offer students an understanding of the
historical and cultural context of America in the contemporary world. Fulfills one-half of the Texas legislative requirement for
six hours in American history. (3-0) S

HST 2301 Issues in American History (3 semester hours) Readings, commentary, and discussion aimed at varying
aspects of history and culture. Fulfills one-half of the Texas legislative requirement for six hours in American history. (3-0) Y

LIT 3330 Linguistics (3 semester hours) The nature of language; general survey of the contributions of linguistics to the
fields of phonetics, phonemics, morphology, lexicology, syntax, and semantics. Other topics of general interest in the field
will be covered, such as language change, dialects, writing systems and their history, use and misuse of language, and the
language of media, advertising, and politics. (3-0) Y

MATH 2417 (MATH 2417) Calculus I (4 semester hours) Functions, limits, continuity, differentiation; integration of function
of one variable; logarithmic, exponential, and inverse trigonometric functions; techniques of integration, and applications.
Three lecture hours and two discussion hours a week. Prerequisite: MATH 2312 or equivalent. (4-0) S

MATH 2418 Linear Algebra (4 semester hours) Systems of linear equations, determinants, vectors and vector spaces,
linear transformations, eigenvalues and eigenvectors, quadratic forms. Three lecture hours and two discussion hours per
week. Credit given for only one of MATH 2333 or 2418. Prerequisite: MATH 2419 or consent of instructor. (4-0) S

MATH 2419 Calculus II (MATH 2419) (4 semester hours) Continuation of MATH 2417. Improper integrals, sequences,
infinite series, power series, parametric equations and polar coordinates, vectors, vector-valued functions, functions of
several variables, partial derivatives and applications, multiple integration. Three lecture hours and two discussion hours a
week. Prerequisite: MATH 2417. (4-0) S
MATH 2421 Multivariable Calculus with Applications (4 semester hours) Vectors, matrices, vector functions, partial derivatives, divergence, curl, Laplacian, multiple integrals, line and surface integrals, Green's, Stoke's, and Gauss's theorems, and applications in physical sciences and engineering. Three lecture hours and two discussion hours per week. Prerequisite: MATH 2419. (4-0) S

NSC 4352 Cellular Neuroscience (3 semester hours) This course focuses on the cell biology and cellular physiology of the neuron. Growth and maintenance of dendrites, axons and synapses, and the underlying processes of macromolecule synthesis, packaging, and transporting are the central biological issues. Electrical signaling, ion channel functions, and synaptic transmission are the main physiological issues. Pre- or corequisite: BIO 2301 or NSC 4361. (Same as PSY 4352.) (3-0) Y

NSC 4353 Neuroscience Laboratory Methods (3 semester hours) This laboratory course provides hands-on experience with the use of electrophysiological techniques for the analysis of living neural preparations. Pre- or corequisite: NSC 4361 or BIO 2301. (This course fulfills the advanced writing requirement for Neuroscience majors and 3 hours of the Communication component of the Core Curriculum). (0-6) Y

NSC 4354 Integrative Neuroscience (3 semester hours) Examines the collective behavior of neuronal systems with respect to sensory processing, motor control, and the plasticity regulating more advanced behavioral, motivational, and cognitive functions. Prerequisite: NSC 4361 (Same as PSY 4354.) (3-0) Y

NSC 4355 Advanced Neuroscience Laboratory (3 semester hours) This laboratory course exposes students to a structured research project, with topics selected from the range of neuroscience faculty interests. It requires students to develop the rationale for experiments and to interpret their results. Each student writes a publication-style paper with reference to the scientific literature. Prerequisite: NSC 4353. (0-6) Y

NSC 4361 Behavioral Neuroscience (3 semester hours) Explores the nature of the brain processes underlying behavior, including consideration of basic neurophysiology and the physiology of sensation, learning, and emotion. Satisfies 3 hours of the Core Curriculum Science (non-lab) requirement. (3-0) S

NSC 4363 Neuropharmacology (3 semester hours) A survey of neurotransmitter functions with special emphasis on effects in the central nervous system. Emphasis is on receptor theory and neurochemistry, but neurotransmitter metabolism and release are also considered. Correlations between neurotransmitter activity and behavior and pathological states are discussed where appropriate. Prerequisite: NSC 4352 or NSC 4354. (Same as PSY 4363.) (3-0) Y

NSC 4366 Neuroanatomy (3 semester hours) Introduction to the anatomical organization and basic functional principles of the major sensory, motor, associational, and modulatory systems of the human brain. Students learn to identify visually specific structures on slides, magnetic resonance images (MRI), and dissected brain specimens in relation to neural pathways and system interconnections. This course provides a basis for a general understanding of the human brain and its functions in relation to disease and behavior. Prerequisite: NSC 4361 or BIO 2301. (Same as PSY 4366.) (3-0) Y

NSC 4367 Developmental Neurobiology (3 semester hours) Examines the processes guiding the proliferation, differentiation and migration of neurons as they form transient or long-lasting connections and circuits. Prerequisite: NSC 4352 or NSC 4354. (Same as PSY 4367.) (3-0) Y

NSC 4368 Computational Neuroscience (3 semester hours) Introduction to state-of-the-art computer methods for simulation of biologically realistic neuronal dynamics. Students must demonstrate some degree of computer skills. (3-0) R

PSY 2301 (PSYC 2301) Introduction to Psychology (3 semester hours) Overviews the major theories and scientific research examining the human mind and behavior. The topics range from studies of perception, cognition, memory, language, and thought to studies of development, personality, relationships, motivation, abnormal patterns of thought and behavior, and cultural differences. Satisfies the Core Curriculum Social and Behavioral Science requirement. (3-0) S

PSY 3362 Cognitive Development (3 semester hours) A contrast of Piagetian, behaviorist, and information-processing approaches to the development of cognitive processes throughout the life span. Pre- or corequisite: PSY 3334. (3-0) Y

PSY 3393 Experimental Projects (3 semester hours) Laboratory and field experience in designing and conducting psychological research, with a major emphasis on the writing of research reports. (This course fulfills the advanced writing requirement for Psychology majors and 3 hours of the Communication component of the Core Curriculum.) Prerequisite: PSY 3392 or PSY 3490. (3-0) S

PSY 3490 Honors Quantitative Methods (4 semester hours) An honors-level survey of methods of conducting research in psychology. Presents measurement techniques, basic research designs, and statistical analyses developed in terms of the
general linear model. Draws upon examples primarily from cognitive and social psychology to illustrate methods in behavioral research. (Offered in the fall semester.) Prerequisite: PSY 2317. (4-0) Y

**PSY 4336 Psychology of Language** (3 semester hours) Psychological processes in the use of language, with consideration of language structure and acquisition. (3-0) T

**PSY 4357 Brain and Memory** (3 semester hours) Current research and theory on modifications in the central nervous system that may underlie memory. Includes an overview of synaptic physiology and pharmacology, and development of the concept of neural plasticity from foundations in anatomy and physiology on the basis of electrical stimulation and pharmacological evidence. Includes discussion of applications such as amnesia. Pre- or corequisite: NSC 4361. (Same as NSC 4357) (3-0) T

**PSY 4360 Learning** (3 semester hours) Theoretical basis of learning is presented with emphasis on results from animal research. Introduces the student to the scientific analysis of behavior and the application of experiments in the development of a psychology of learning. Includes classical and instrumental conditioning, non-associative learning, and behavior modification. Prerequisite: PSY 2301. (3-0) Y

**PSY 4362 Perception** (3 semester 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. Pre- or corequisite: NSC 4361. (3-0) Y

**PSY 4364 Attention and Memory** (3 semester hours) Factors influencing the capacity to pick up, organize, and remember complex information. Prerequisite: PSY 3361, or consent of instructor. (3-0) T

**PSY 4374 Judgment and Decision Making** (3 semester hours) Processes of human judgment will be examined from the perspective of cognitive, computer-based, and social psychological theories of inference. Focus is on specific domains of judgment, such as attitude formation and change, biases and prejudices, decision making in organizations, and marketing strategies to illustrate basic principles of decision making. Pre- or corequisite: PSY 3361. (3-0) Y

**RHET 1302 (ENGL 1302) Rhetoric** (3 semester hours) The course presents an integrated approach to writing, reading, and critical thinking by developing the grammatical, logical, and rhetorical skills necessary for university writing. All classes work in a computerized learning environment. Students are taught basic computer literacy and submit all work electronically and on paper. (3-0) S

**SPAU 3303 Normal Language Development** (3 semester hours) The development of communication, including phonology, syntax, semantics, and pragmatics, with emphasis on theories of language acquisition. (3-0) Y

**SPAU 3304 Communication Sciences** (3 semester hours) Fundamentals of acoustics for speech and hearing, basic auditory phenomena, and the acoustic properties of speech. (3-0) Y

**SPAU 3343 Phonetics** (3 semester hours) The study of speech sounds. Phonetic transcription and description of articulatory, acoustic, and linguistic properties of speech. (3-0) Y

**SPAU 3344 Anatomy and Physiology of Speech and Hearing** (3 semester hours) Study of anatomic and physiologic mechanisms underlying speech respiration; phonation; articulation. Overview of the peripheral auditory system. (3-0) Y

**SPAU 3345 Neural Basis of Communication** (3 semester hours) Cortical and subcortical mechanisms underlying sensory, motor, and cognitive aspects of communication. (3-0) Y

**STAT 4351 Probability** (3 semester hours) Probability models, random variables, expectation, special distributions, and the central limit theorem. The theory is illustrated by numerous examples. Prerequisite: MATH 2421. (3-0) T