Neuroscience (B.S.)

Neuroscience is the multidisciplinary study of brain function that draws on recent advances in computer science, biology, chemistry, physics, and cognitive science. It examines the brain's global biochemistry, the subcellular processes of its individual cellular components, its complex and extensively networked anatomical structure, and its remarkably adaptive physiology. The field considers neuronal development from early embryology through advanced senescence, and examine the brain's adaptive processes at the level of single neurons, through networks and systems of cells, on up to complete organisms. It studies the regulation and expression of behavior, and the complex interactions of multiple neuronal systems that underlie the emergence of cognitive function. The Neuroscience program at U. T. Dallas provides students with the opportunity to focus on the brain from a systems-level perspective, drawing on the behavioral and cognitive perspectives of psychology and the cellular and molecular perspectives of biology. It allows undergraduates extensive interactions with working neuroscientists who use the latest analytic techniques.

The Neuroscience program is designed to prepare students for admission to graduate or medical school, or for careers in related biomedical research, medicine, dentistry, and other health science specialties. Required courses and guided electives include the approved pre-medical curriculum and offer an alternative to other traditional pre-medical majors. Students who wish to continue their education in the fields of medicine, dentistry or allied professional areas should register with the Health Professions Advisory Committee during their first semester. Students are encouraged to design a personalized degree plan of guided electives with their advisor that will combine courses from the related disciplines of mathematics, physics, chemistry, biology, engineering, computer science, psychology, and speech pathology and audiology in a way that will suit their individual interests and goals.

Bachelor of Science in Neuroscience Degree Requirements (120 hours)

I. Core Curriculum Requirements*: 42 hours

A. Communication (6 hours)
   3 hours Communication (RHET 1302)
   3 hours Communication Elective (NSC 4353)²
B. Social and Behavioral Sciences (15 hours)
   6 hours Government (GOVT 2305 and 2306)
   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)
   3 hrs College Math (Math 2417)³
   3 hrs Quantitative Methods (PSY 2317 or 3490)⁴
E. Science (9 hours)
   9 hrs Science (CHM 1311 and 1111, BIO 2301 and 2281)²

* 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: 56 hours

   Major Preparatory Courses (5 hours beyond Core Curriculum)
   BIO 2301 Introduction to Modern Biology² *
BIO 2281 Introductory Biology Laboratory 2
CHM 1311/1111 General Chemistry I w/ lab 2
CHM 1312/1112 General Chemistry II w/ lab
MATH 2417 Calculus I 3
PSY 2301 Mind and Behavior 2
STAT 1342 Statistical Decision Making OR PSY 2317 Statistics for Psy. 4

Preparatory Guided Electives; 18 hours selected from the following:
  BIO 2302 Introduction to Modern Biology II
  BIO 3301 Classic and Molecular Genetics 3
  BIO 3302 Eukaryotic Molecular and Cell Biology
  BIO 3361 Biochemistry I 3
  BIO 3362 Biochemistry II 3
  CGS 2401 Cognitive Science
  CGS 3325 Historical Perspectives on Psychology: Mind and Machines Since 1600
  CGS 3361 Cognitive Psychology
  CHM 2323/2123 Introductory Organic Chemistry I w/lab
  CHM 2325/2225 Introductory Organic Chemistry II w/lab
  CS 1315 Computer Science I
  CS 2315 Computer Science II
  EE 2305 Fundamentals of Electrical Engineering
  MATH 2419 Calculus II
  MATH 2420 Differential Equations with Applications
  PHYS 1301/1101 College Physics I w/lab
  PHYS 1302/1102 College Physics II w/lab
  PHYS 3341/2125 Physics for Biosciences I w/lab
  PHYS 3342/2126 Physics for Biosciences II w/lab

Major Core Courses (18 hours beyond Core Curriculum)
  NSC 4352 Cellular Neuroscience
  NSC 4353 Neuroscience Laboratory Methods 2
  NSC 4354 Integrative Neuroscience
  NSC 4361 Behavioral Neuroscience
  NSC 4363 Neuropharmacology
  NSC 4366 Neuroanatomy
  NSC 4367 Developmental Neurobiology

Major Related Courses (15 hours)
Advanced Guided Electives (15 hours); Students select 15 semester hours from the following. Consultation with an advisor is recommended.
  CGS 4310 Computational Models of Knowledge Structures
  NSC 4355 Advanced Neuroscience Laboratory
  NSC 4356 Neurophysiology
  NSC 4368 Computational Neuroscience
  NSC 4390 Special Topics in Neuroscience
  NSC 4394 Internship in Neuroscience
  NSC 4397 Honors Thesis
  NSC 4V98 Research in Neuroscience
  NSC 4V99 Independent Study in Neuroscience
  PSY 4357 Brain and Memory
  PSY 4360 Learning
  PSY 4362 Perception
  SPAU 3304 Communication Sciences
III. Elective Requirements: 22 hours

Advanced Electives (6 hours)
- Breadth Electives: 6 hours of upper-division courses, or lower-division courses that have prerequisites that are outside of Neuroscience.

Free Electives (16 hours)
- At least 16 hours of lower- or upper-division courses of the student's choice. Students are encouraged to explore areas of concentration in Neuroscience 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 Neuroscience

Students who are not majoring in Neuroscience may minor in Neuroscience 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 Neuroscience 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 satisfy requirements for the master's degree. Students must maintain a 3.0 grade point average and earn grades of B or better in graduate courses taken. The Fast Track makes it possible for students to complete upper-division undergraduate education and graduate training in three years, including summer study. For admission into 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

BIO 2281 Introductory Biology Laboratory (2 semester hours) Experiments designed to illustrate the chemical nature of genes and gene expression. Among the topics to be introduced are biomolecular structure, enzymology, electron
microscopy, cell biology, and the properties of DNA. Techniques include column chromatography, spectroscopy, cytochemistry, basic microbiological manipulations, gel electrophoresis of nucleic acids and proteins, the isolation of DNA, and computer-aided visualization of macromolecular structures. Prerequisite: BIO 2301 (also see prerequisites for BIO 2301). (1-4) Y

BIO 2301 Introduction to Modern Biology I (3 semester hours) Presentation of some of the fundamental concepts of modern biology, with an emphasis on the molecular and cellular basis of biological phenomena. Topics include the chemistry and metabolism of biological molecules, elementary classical and molecular genetics, and selected aspects of developmental biology, physiology (including hormone action), immunity, and neurophysiology. Prerequisites: General Chemistry I and II. Corequisite: concurrent enrollment in BIO 2101. (3-0) Y

BIO 2302 Introduction to Modern Biology II (3 semester hours) Continuation of BIO 2301. The emphasis will be on evolution, biological diversity, physiology, and developmental biology. Corequisite: concurrent enrollment in BIO 2102. (3-0) S

BIO 3301 Classical and Molecular Genetics (3 semester hours) The phenomenon of heredity, its cytological and molecular basis; gene expression and transfer of genetic information, with major focus on bacterial and model eukaryotic systems; genetic recombination and chromosome mapping; tetrad analysis; mutations and mutagenesis; genetic interactions; application of recombinant DNA techniques to genetic analysis. Prerequisites: BIO 2301 and Organic Chemistry I. Corequisite: concurrent enrollment in BIO 3101. (3-0) S

BIO 3302 Eukaryotic Molecular and Cell Biology (3 semester hour) Structural organization of eukaryotic cells; regulation of cellular activities; membranes and transport; cellular replication; examples of cell specialization such as blood (immunoglobulins) and muscle cells. Prerequisites: BIO 3301 and BIO 3361. Corequisite: concurrent enrollment in BIO 3102. (3-0) S

BIO 3361 Biochemistry I (3 semester hours) Structures and chemical properties of amino acids; protein purification and characterization; protein structure and thermodynamics of polypeptide chain folding; catalytic mechanisms, kinetics and regulation of enzymes; energetics of biochemical reactions; generation and storage of metabolic energy associated with carbohydrates; oxidative phosphorylation and electron transport mechanisms; photosynthesis. Prerequisites: Organic Chemistry I and II. Corequisite: concurrent enrollment in BIO 3161. (3-0) S

BIO 3362 Biochemistry II (3 semester hours) Breakdown and synthesis of lipids; membrane structure and function; nitrogen metabolism and fixation; nucleotide metabolism; structure and properties of nucleic acids; sequencing and genetic engineering; replication, transcription, and translation; chromosome structure; hormone action; biochemical basis of certain pathological processes. Prerequisite: BIO 3361 or its equivalent, or consent of instructor. Corequisite: concurrent enrollment in BIO 3162. (3-0) Y

CGS 2401 Cognitive Science (4 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 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 4310 Computational Models of Information Processing Systems (3 semester hours) Computer and engineering science perspectives on the simulation of intelligent systems. Applications in natural language, sensory systems, and robotics. Prerequisite: CGS 2401 or MATH 2418. (3-0) T

CHM 1111 (CHEM 1111) General Chemistry Laboratory I (1 semester hour) Introduction to the chemistry laboratory. Experiments are designed to demonstrate concepts covered in CHM 1311; including properties and reactions of inorganic substances, and elementary qualitative and quantitative analysis. (0-3) S

CHM 1112 General Chemistry Laboratory II (1 semester hour) A continuation of CHM 1111 demonstrating the concepts
covered in CHM 1312, including acid-base chemistry, reaction kinetics, electrochemistry, polymers, and organic synthesis. Prerequisite: CHM 1111 or 1215. (0-3) S

CHM 1311 (CHEM 1311) General Chemistry I (3 semester hours) Introduction to elementary concepts of chemistry theory. The course emphasizes chemical reactions, the mole concept and its applications, and molecular structure and bonding. (3-0) S

CHM 1312 (CHEM 1312) General Chemistry II (3 semester hours) A continuation of CHM 1311 treating metals; solids, liquids, and intermolecular forces; chemical equilibrium; electrochemistry; organic chemistry; rates of reactions; and environmental, polymer, nuclear, and biochemistry. Prerequisite: CHM 1311 or 1315. (3-0) S

CHM 2123 (CHEM 2123) Introductory Organic Chemistry Laboratory I (1 semester hour) The experimental skills associated with organic functional group reactions. Prerequisite: CHM 2223 (may be taken concurrently). (0-4) S

CHM 2225 (CHEM 2225) Introductory Organic Chemistry Laboratory II (2 semester hours) Continuation of Organic Chemistry Laboratory I. Prerequisites: CHM 2323 and 2123; corequisite: CHM 2225. (0-8) S

CHM 2323 (CHEM 2323) Introductory Organic Chemistry I (3 semester hours) The covalent bond. Organic chemistry: aliphatic and aromatic compounds; covalent inorganic and organometallic compounds; a survey of the organic functional groups and their typical reactions; stereochemistry. The first course in organic chemistry. Satisfies the basic organic chemistry lecture requirements for pre-health profession students. Prerequisite: CHM 1312 or 1316. (3-0) 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 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

EE 2305 (ENGR 2305) Fundamentals of Electrical Engineering (3 semester hours) An introduction to some of the unifying concepts in electrical engineering; analysis and synthesis of signal waveforms; modification of waveforms by electrical systems; current-voltage relationships for common components; DC circuit analysis. Corequisites or Prerequisites: PHYS 2326, MATH 2420. (3-0) S

GOVT 2305 (GOVT 2305) 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 2306 (GOVT 2306) 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

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 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 2420 (MATH 2420) Differential Equations with Applications (4 semester hours) Topics covered will be drawn from the following list: First order differential equations, ordinary differential equations, system of linear differential equations, stability, series solutions, special functions, Sturm-Liouville problem, Laplace transforms and linear differential equations, numerical solutions and applications in physical sciences and engineering using computers. 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 4356 Neurophysiology (3 semester 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. Prerequisite: NSC 4352. (Same as PSY 4356.) (3-0) 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 neural dynamics. Students must demonstrate some degree of computer skills. (3-0) R

NSC 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 CGS 4394, PSY 4394 and SPAU 4393.) (3-0) S
NSC 4397 Honors Thesis (3 semester hours) An independent study project in which the student writes an honors thesis under faculty supervision. (3-0) S

NSC 4V90 Special Topics in Neuroscience (1-6 semester hours) May be repeated for credit (9 hours maximum). ([1-6]-0) R

NSC 4V98 Research in Neuroscience (1-6 semester hours) Independent study course in which the student conducts a research project under faculty supervision and writes a paper. May be repeated for credit. (3-0) S

NSC 4V99 Independent Study in Neuroscience (1-6 semester hours) Assist faculty with research projects or study advanced topics under weekly faculty direction. Must be taken on a Credit/No Credit basis unless program head approves for letter grade. May be repeated for credit. (1-6]-0) S

PHYS 1101 (PHYS 1101) College Physics Laboratory (1 semester hour) A laboratory to accompany PHYS 1301. Corequisite: PHYS 1301 (0-3) Y

PHYS 1102 (PHYS 1102) College Physics Laboratory II (1 semester hour) A laboratory to accompany PHYS 1302. Corequisite: PHYS 1302. (0-3) Y

PHYS 1301 (PHYS 1301) College Physics I (3 semester hours) Algebra based basic physics. Topics include mechanics, heat and thermodynamics. Prerequisite: MATH 1314. (3-0) Y

PHYS 1302 (PHYS 1302) College Physics II (3 semester hours) Continuation of PHYS 1301. Topics include electricity and magnetism and optics. Prerequisites: PHYS 1301. (3-0) Y

PHYS 2125 (PHYS 2125) Physics Laboratory I (1 semester hour) Laboratory course to accompany PHYS 2325. Personal computer-based data presentation and curve fitting. Basic measurement concepts such as experimental uncertainty, mean, standard deviation, standard error, and error propagation will be covered. Corequisite: PHYS 2325. (0-3) Y

PHYS 2126 (PHYS 2126) Physics Laboratory II (1 semester hour) Laboratory course to accompany PHYS 2326. Builds on concepts of Physics Lab I. Will emphasize the use of an oscilloscope and measurements using simple circuits constructed in class. Corequisite: PHYS 2326. (0-3) Y

PHYS 3341 Physics for Bio Science I (3 semester hours) Calculus based. Basic physics for pre-health science students. Topics include space and time, kinematics, forces, energy and momentum, conservation laws, rotation, thermodynamics, and kinetic theory. Focus is on biological applications. Prerequisite: MATH 2417. Must register for Physics Lab I. (PHYS 2125). (3-0) Y

PHYS 3342 Physics for Bio Science II (3 semester hours) Continuation of PHYS 3341. Topics include electrostatics and electromagnetics, electric field and potential, electric currents, magnetic fields, laws of Coulomb, Ampere, and Faraday; Maxwell's theory of propagation, and optics. Focus is on biological applications. Prerequisites: PHYS 3341 and MATH 2419. Must register for Physics Lab II. (PHYS 2126) (3-0) Y

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 2317 (PSY 2317) Statistics for Psychology (3 semester hours) This course introduces concepts and calculations of descriptive statistics, including mean, sum of squares, variance, standard deviation, correlation and regression. It also includes the logic of statistical decision making, the use of binomial and Gaussian distributions, and fundamental considerations in the design of psychological experiments. Prerequisite: 3 semester hours college-level mathematics. (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 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) The 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

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 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 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 1342 (MATH 1342) Statistical Decision Making (3 semester hours) Principles of quantitative decision making: summarizing data, modeling uncertainty, loss functions, probability, conditional probability, random variables. Introduction to statistics: estimation, confidence intervals, hypothesis testing, regression. Introduction to statistical packages. Cannot be used to satisfy degree requirements for majors in the School of Engineering and Computer Science, or major requirements in the Schools of Management or Natural Sciences and Mathematics. Prerequisite: MATH 1300, MATH 1304, MATH 1314 or equivalent. (3-0) S