The School of Science and Engineering

Neuroscience

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MAJOR

A major in Neuroscience allows a student to pursue an interdepartmental curriculum that focuses on the role of the nervous system in regulating physiological and behavioral functions. Neuroscience combines many traditional fields of study including Psychology, Biology, Chemistry, Physics, Anatomy, and Physiology. The field of Neuroscience encompasses a broad domain that ranges from the cellular and molecular control of brain cells to the regulation of responses in whole organisms.

The student majoring in Neuroscience fulfills the standard requirements of a premedical curriculum, which is recommended or required for admission to graduate study in Neuroscience or related graduate programs. This curriculum also enables the student to pursue medical training, possibly specializing in an area related to Neuroscience.

A Bachelor of Science in Neuroscience requires nine credits of core courses, 9 credits of elective courses, three credits of laboratory courses, and 30 credits of co-requisite courses in biology, psychology, chemistry, and physics totaling 51 credits. At least six of the elective lecture credits and one of the laboratory credits must be taken from the list of Neuroscience courses.

A student majoring in Neuroscience is strongly encouraged to pursue research in laboratories on the Main Campus or at the Health Sciences Center as an independent study and/or an honors thesis. An independent study or honors thesis may fulfill one of the three required laboratory courses.

Required Core Courses (nine credits)

NSCI/PSYC 367 Brain and Behavior

NSCI/CELL 331 Cellular Neuroscience

NSCI/CELL 332 Systems Neuroscience

Elective Neuroscience Courses (minimum six credits)

NSCI/LING 411 Brain and Language

NSCI/CELL 434 Neurobiology of Disease

NSCI/CELL 435 Developmental Neurobiology

NSCI/CELL 437 Molecular Neurobiology

NSCI 600 Methods in Neuroscience

NSCI/PSYC 651 Biological Psychology

NSCI/PSYC 653 Psychopharmacology

NSCI/PSYC 655 Behavioral Neuroendocrinology

NSCI/PSYC 657 Cognitive Neuroscience

NSCI/PSYC 659 Stress and Trauma

NSCI/CELL 663 Cellular Neurophysiology

CELL 655 Synaptic Organization of the Brain

Elective Laboratory Courses (minimum of three labs)

CELL 211 General Biology Lab

CELL 302 Cell Biology Lab

CELL 312 Molecular Biology Lab

CELL 411 Cells and Tissues (Lecture/Lab)

CELL 413 Embryology (Lecture/Lab)

BMEN 303/313 Human Anatomy and Physiology I (Lecture/Lab)

BMEN 304/314 Human Anatomy and Physiology II (Lecture/Lab)

PSYC 313 Experimental Psych (Lecture/Lab)

PSYC 369 Experimental Animal Behavior (Lecture/Lab)

NSCI/CELL 334 Neuroanatomy Lab

NSCI 601 Methods in Neuroscience Lab

NSCI/PSYC 652 Biological Psychology Lab

NSCI/PSYC 654 Psychopharmacology Lab

NSCI/PSYC 656 Behavioral Neuroendocrinology Lab

NSCI/PSYC 658 Cognitive Neuroscience Lab

NSCI/PSYC 660 Stress and Trauma Lab

Independent Study or Honors Thesis may count as one lab course.

Elective Lecture Courses (minimum of three credits)

CELL 205 Genetics

CELL 301 Cell Biology

CELL 305 Drugs and Their Actions

CELL 311 Molecular Biology

CELL 321 Cellular Physiology

CELL 401 Cellular Biochemistry

CELL 416 Developmental Biology

CELL 608 Advanced Developmental and Cell Biology II

EBIO 101/111 Diversity of Life (Lecture/Lab)

EBIO 333 Human Physiology

PSYC 209/609 Psychological Applications of Univariate Statistics I

PSYC 333 Abnormal Psychology

PSYC 368 Comparative Animal Behavior

PSYC 611 Psychological Applications of Univariate Statistics II

Corequisite Courses (30 credits)

CELL 101 General Biology

CHEM 107/117 General Chemistry

CHEM 108/118 General Chemistry

CHEM 241/243 Organic Chemistry

CHEM 242/244 Organic Chemistry

PHYS 121 or 131 General Physics

PHYS 122 or 132 General Physics

PSYC 100, 101, or 102 Introductory Psychology

REQUIRED CORE COURSES

NSCI 331 Cellular Neuroscience (3)
Prof. Tasker. Prerequisite: CELL 101. In-depth coverage of the basic principles of cellular neuroscience, including the biophysical basis of the membrane potential, action potential generation and propagation, and synaptic signaling. Students also will be introduced to the synaptic organization of higher neural systems, such as the visual, auditory and somatic sensory systems. Same as CELL 331.

NSCI 332 Systems Neuroscience (3)
Prof. Smith. Prerequisite: CELL 101 or approval of instructor. The subject of this course is the human nervous system, its anatomy, connectivity, and function. Discusses the normal structure of the nervous system and the relationship of that structure to physiological function. The course is taught from a practical, clinical point of view and is intended to prepare students for further study in the neurosciences. Same as CELL 332.

NSCI 367 Brain and Behavior (3)
Prof. Colombo, Prof. Dohanich, Prof. Wee. Prerequisite: PSYC 100, H101 or 102. Lectures cover the function and structure of the

nervous system and the role of brain activity in the regulation of behavior. This course provides Neuroscience majors with a first exposure to the biological bases of behavior and should be taken prior to other Neuroscience courses at the 300 level and above. Same as PSYC 367.

COURSES FOR INTERMEDIATE AND ADVANCED UNDERGRADUATES

NSCI 411 Brain and Language (3)
Prof. Howard. The goal of this course is to learn how the brain is organized to produce and comprehend language and to understand linguistic disorders attendant on brain damage. There is an optional service learning component in which students can work with a speech therapist at a local health-care provider. Same as LING 411.

NSCI 434 Neurobiology of Disease (3)
Staff. Prerequisite: NSCI/CELL 331. Advanced course on the higher neural functions of the nervous system and neurological diseases resulting from disruption of these functions. An emphasis is placed on the physiology of the nervous system and neural dysfunction caused by inherited and acquired diseases. Topics range from motor control and neuromuscular diseases to high cognitive function and dementia. Same as CELL 434.

NSCI 435 Developmental Neurobiology (3)
Prof. Inglis. Prerequisite: NSCI/CELL 331 or CELL 416 or approval of instructor. A broad overview of the different stages of neural development. Examination of the molecular aspects of developmental neurobiology, with reference to some important signaling pathways involved in neural growth and specification. Particular attention will be given to those active research fields, such as growth cone guidance and collapse and activity-dependent development, and applications of these to injury and disease. Same as CELL 435.

NSCI 437 Molecular Neurobiology (3)
Prof. Inglis. Prerequisite: NSCI/CELL 331 or 332 or approval of instructor. Introduction to the molecular biology of neurons and neuronal function. Topics of study will include: the molecular composition of nerve cells, and how this provides a basis for their functional properties; their synaptic connectivity; how they receive, transmit and retain information at a molecular level.

Studies will focus on current research in the field of molecular neurobiology. Same as CELL 437.

COURSES FOR ADVANCED UNDERGRADUATES AND GRADUATES

NSCI 600 Methods in Neuroscience (3)
Prof. Wee. Prerequisite: NSCI/PSYC 367. A lecture course exposing students to contemporary theories and techniques used by Tulane neuroscientists in their own research programs. The course is taught by faculty members representing several departments from both the uptown campus and the Health Sciences Center.

NSCI 631 Cellular Neuroscience (3)
See NSCI 331 for course description. In addition, a term paper is required. Same as CELL 631.

NSCI 634 Neurobiology of Disease (3)
See NSCI 434 for course description. In addition, a term paper is required. Same as CELL 634.

NSCI 635 Developmental Neurobiology (3)
See NSCI 435 for course description. In addition, a term paper is required. Same as CELL 635.

NSCI 637 Molecular Neurobiology (3)
See NSCI 437 for course description. In addition, a term paper is required. Same as CELL 637.

NSCI 651 Biological Psychology (3)
Prof. Colombo. Prerequisite: NSCI/PSYC 367 or approval of instructor. An intensive survey of biological psychology with an emphasis on neuroanatomy and research methods used to study mechanisms of learning and memory, mental disorders, emotion, stress, and other psychological phenomena. Same as PSYC 651.

NSCI 653 Psychopharmacology (3)
Prof. Dohanich. Prerequisite: NSCI/PSYC 367 or approval of instructor. An introduction to the effects of psychoactive agents on the nervous system. Lectures emphasize the mechanisms by which drugs regulate neurotransmitter systems to alter psychological and physical states. Same as PSYC 653.

NSCI 655 Behavioral Neuroendocrinology (3)
Prof. Dohanich. Prerequisite: NSCI/PSYC 367 or approval of instructor. An introduction to the roles of steroid and peptide hormones in physiology and behavior. Lectures focus on the

hormonal mechanisms that control reproductive and regulatory functions in human and infrahuman species. Same as PSYC 655.

NSCI 657 Cognitive Neuroscience (3)
Prof. Golob. Prerequisites: PSYC 100, NSCI/PSYC 367 An introduction to the study of human behavior and cognition using neuroscience methods. The course will examine the neural basis of perception, attention, memory, language, motor control, and emotions. Same as PSYC 657.

NCSI 659 Stress and Trauma (3)
Prof. Overstreet. Prerequisites: PSYC 209, 367, and PSYC 333 or 334. This course provides an overview of the psychobiological bases of stress and trauma reactions and related psychological disorders. Same as PSYC 659.

NSCI 663 Cellular Neurophysiology (3)
Prof. Smith. Prerequisite: NSCI/CELL 331 or approval of instructor. Survey of current topics and techniques in the physiology of neurons and neuronal circuits, concentrating primarily on electrophysiological studies. Same as CELL 663.

CELL 655 Synaptic Organization of the Brain (3)
Prof. Tasker. Prerequisite: 331 or approval of instructor. This course is offered jointly by Tulane and LSU Medical School every other year. It provides an in-depth examination of the physiologic and anatomic organization of the major structures of the brain and spinal cord. It is team taught by members of both faculties, drawing from the research expertise of the faculty of the two schools.

LABORATORY COURSES

NSCI 334 Neuroanatomy Laboratory (1)
Prof. Smith. Corequisite or prerequisite: NSCI/CELL 332. The subject of this course is the anatomy of the human nervous system. Students will learn to identify and map the structure and position of nuclei, pathways, and anatomical divisions of the brain and spinal cord. The course is a practical correlate to Systems Neuroscience (NSCI 332), and is intended to prepare students for further study in the neurosciences. Satisfies CMB and neuroscience laboratory requirement. Same as CELL 334.

NSCI 601 Methods in Neuroscience Laboratory (1)
Prof. Wee. Corequisite: NSCI 600. Prerequisite: NSCI/PSYC 367. A laboratory course allowing students to follow a neuroscience

experiment from hypothesis-design development to neurochemical analyses. The course provides direct exposure to drug administration, behavioral assessment, tissue preparation, and in vitro analysis of neurochemicals. Satisfies psychology and neuroscience laboratory requirement. Fulfills college laboratory requirement.

NSCI 652 Biological Psychology Laboratory (1)
Prof. Colombo, Hebert. Corequisite: NSCI/PSYC 651. Prerequisite: PSYC 209. A laboratory course providing training in behavioral and neurobiological methods, experimental design, data collection and analysis and preparation of research reports. Satisfies psychology and neuroscience laboratory requirement. Fulfills college laboratory and writing requirements. Same as PSYC 652.

NSCI 654 Psychopharmacology Laboratory (1)
Prof. Dohanich. Corequisite: NSCI/PSYC 653. Prerequisite: PSYC 209. Laboratories provide demonstration and hands-on experience in research methods used in contemporary psychopharmacology including receptor measurement, models of drug abuse and psychopathology, data analysis, and manuscript preparation. Satisfies psychology laboratory requirement. Fulfills college laboratory requirement. Same as PSYC 654.

NSCI 656 Behavioral Neuroendocrinology Laboratory (1)
Prof. Dohanich, Wee. Corequisite: NSCI/PSYC 655. Prerequisite: PSYC 209. Laboratories provide demonstration and hands-on experience in research methods used in contemporary neuroendocrinology including hormonal manipulation, behavioral measurement, data analysis, and manuscript preparation. Satisfies psychology and neuroscience laboratory requirement. Fulfills college laboratory requirement. Same as PSYC 656.

NSCI 658 Cognitive Neuroscience Laboratory (1)
Prof. Golob, Hebert. Corequisite: NSCI/PSYC 657. Prerequisites: PSYC 209 and instructor approval. A laboratory course that provides training in experimental design and ethical issues, data collection, analysis, and manuscript preparation for cognitive neuroscience experiments. Methods used in cognitive neuroscience research, such as event-related potentials, structural and functional MRI, also will be discussed. Students will conduct their own studies using behavioral and brain electrical activity measures. Satisfies psychology and neuroscience laboratory requirement. Fulfills college laboratory requirement. Same as PSYC 658.

NSCI 660 Stress and Trauma Laboratory (1)
Prof. Overstreet. Corequisite: PSYC 659. Prerequisites: PSYC 209. In this laboratory course students will complete an empirical research project on a subject within the field of stress and trauma. Satisfies, in part, psychology laboratory requirement. Same as PSYC 600.

SPECIAL TOPICS AND PROJECTS COURSES

NSCI 491, 492 Independent Studies (1-3, 1-3)
Staff. Laboratory research under direction of a faculty member.

NSCI 495, 496 Special Topics (1-3, 1-3)
Staff. Projects supervised by program faculty members.

NSCI H499, H500 Honors Thesis (3, 4)
Staff. Admission by department and Honors Committee approval.