300 Neurobiology
Fall, Spring, 3(3-0) Interdepartmental with Integrative Biology. Administered by Neuroscience. P: (BS 162 or LB 144 or BS 182H) and (BS 161 or LB 145 or BS 181H) R: Not open to freshmen or sophomores and not open to students in the Program in Neuroscience and not open to students in the Lyman Briggs Neuroscience Major. SA: ZOL 402.
Structure and function of nerve cells and nervous systems.

301 Introduction to Neuroscience I
Fall, Spring, 3(3-0) Interdepartmental with Integrative Biology. Administered by Neuroscience. P: (BS 162 or LB 144 or BS 182H) and (BS 161 or LB 145 or BS 181H) R: Not open to freshmen or sophomores and not open to students in the Program in Neuroscience and not open to students in the Lyman Briggs Neuroscience Major. SA: ZOL 402.
Survey of the field of neuroscience, including molecular, cellular, and autonomic, sensory and motor systems.

304 Neuroanatomy
Summer, 3(3-0) P: Completion of Tier I Writing Requirement R: Not open to freshmen. Approval of department; application required.
Structure and basic function of human nervous system, including the influence of art and cultural values on neuroanatomical knowledge throughout history.

306 History of Neuroscience
Summer, 3(3-0) P: Completion of Tier I Writing Requirement R: Not open to freshmen. Approval of department; application required.
Specific topics in the history of neuroscience with an emphasis on the influence of cultural values on theories and discoveries.

307 Topics in History of Neuroscience (W)
Summer, 3(3-0) P: Completion of Tier I Writing Requirement R: Not open to freshmen. Approval of department; application required.
Independent library research and group tutorial work aimed at critical analysis of the role that cultural values and historical events played in the specific topic investigated.

310 Psychology and Biology of Human Sexuality
Spring of even years, 3(3-0) Interdepartmental with Integrative Biology and Psychology. Administered by Neuroscience. P: (PSY 101 or concurrently) and ((BS 161 or concurrently) or (BS 162 or concurrently) or (LB 144 or concurrently)) or (LB 145 or concurrently or (BS 181H or concurrently) or (BS 182H or concurrently)) Not open to students with credit in HDF 445.

311L Neuroscience Laboratory (W)
Fall, Spring, 2(2-0) Interdepartmental with Pharmacology and Toxicology. P: NEU 301 or PSL 250 or PSL 310 or PSY 295 R: Open to undergraduate students in the Lyman Briggs Neuroscience Major. SA: ZOL 402.
Overview of neuroscience research methodology, including experimental design, data analysis, and presentation of results.

333 The Neurobiology of Food Intake and Overeating
Spring, 3(3-0) Interdepartmental with Psychology. Administered by Psychology. P: PSY 101 R: PSY 209
Physiological and neurological mechanisms that drive food intake and overeating. Vulnerabilities to obesity.

415 Neuroinformatics and Quantitative Reasoning
Fall, 3(3-0) P: ((NEU 301 or and (NEU 302 or concurrently) and completion of Tier I writing requirement) and (STT 201 or STT 231 or STT 421) and (BS 171 or BS 191H or LB 145) R: PSY 101 R: Open to undergraduate students in the Program in Neuroscience or in the Lyman Briggs Neuroscience Coordinate Major.
Quantitative reasoning and statistical methods for querying internet databases and understanding basic neuroscience models.

416 Development of the Nervous System Through the Lifespan
Fall, 3(3-0) Interdepartmental with Integrative Biology. Administered by Neuroscience. P: NEU 302 or IBIO 300 or PSY 209 R: IBIO 341 R: Open to undergraduate students in the Program in Neuroscience or in the Department of Integrative Biology or in the Department of Psychology or in the Lyman Briggs Neuroscience Major or in the Lyman Briggs Zoology Coordinate Major.
Development of neurons and their connections, roles of both genetics and behavioral experience in shaping the mammalian nervous system.

417 Instrumental Methods of Analysis in Neuroscience
Spring, 3(3-0) Interdepartmental with Chemistry. Administered by Neuroscience. P: (((CEM 251 and CEM 252) or (CEM 351 and CEM 352) and (PHY 231 and PHY 232)) or (PHY 183 and PHY 184) or (PHY 193H and PHY 294H) or (LB 273 and LB 274)) R: NEU 301 or CEM 262.
Design, operational principles and practical application of modern instrumental methods used for the separation, identification and quantification of neurochemical species in neuroscience. Application of methods of chemical analysis to study neurosignaling, chemical composition in single secretory cells, chemical structure of cells and tissues.

420 Neurobiology of Disease
Spring, 3(3-0) P: NEU 301 and NEU 302 R: Open to undergraduate students in the Program in Neuroscience or in the Lyman Briggs Neuroscience Coordinate Major.
Genetic, molecular, cellular, systems, and behavioral abnormalities that contribute to the manifestation of neurologic and psychiatric diseases and disorders that affect the nervous system.

422 Fundamentals of Neuropharmacology
Spring, 2(2-0) Interdepartmental with Pharmacology and Toxicology. Administered by Pharmacology and Toxicology. P: NEU 301 or PSL 250 or PSL 310 or PSL 431 R: Open to juniors or seniors or approval of department.
Mechanisms and uses of action of drugs on neurons and neuron-controlled activities.

425 Computational Modeling in Neuroscience
Spring, 3(3-0) P: NEU 302 RB: (MTH 124 and MTH 126) or (MTH 132 and MTH 133) R: Open to undergraduate students in the Neuroscience Major or in the Lyman Briggs Neuroscience Major.
Introduction to theory and network modeling techniques in neuroscience, using brain activity data to validate theoretical models. Review of successful network models.

430 Genomics of Brain Development, Learning, and Behavior
Summer, 3(3-0) P: (IBIO 341) and (NEU 302 or concurrently) RB: PSY 209.
Role of genes in brain development and function. Issues in behavioral and psychiatric genetics.
Neuroscience—NEU

431 Pharmacology of Drug Addiction Fall. 3(3-0) Interdepartmental with Pharmacology and Toxicology. Administered by Pharmacology and Toxicology. RB: Zoology or Human Biology or Psychology or Biochemistry or Physiology. Introduction to pharmacology and neuropharmacology. Understanding of the biological basis for drug abuse and addiction.

435 Ion Channels of Excitable Membranes Fall. 3(3-0) Interdepartmental with Integrative Biology. Administered by Neuroscience. P: (NEU 302 and NEU 311L) or IBIO 402 RB: (PHM 350 or PSL 431) and IBIO 341 R: Open to undergraduate students in the Neuroscience Major or in the Bachelor of Science in Zoology or in the Lyman Briggs Neuroscience Major or in the Lyman Briggs Zoology Coordinate Major.

Introduction to ion channels and their critical role in normal physiological functioning, sensory and neuromuscular diseases and disorders, as well as targets of toxins and poisons.

440 Synaptic Transmission Spring of even years. 3(3-0) P: NEU 301 R: Open to undergraduate students in the Neuroscience Major or in the Lyman Briggs Neuroscience Major.

Chemical and electrical aspects of nerve impulse transmission at synaptic and neuroeffector junctions. Influence of drugs.

445 Analysis of Neural Activity Data (W) Fall. 3(3-0) P: (NEU 301 and (NEU 302 or concurrently)) and completion of Tier I writing requirement) and (MTH 124 or MTH 132 or MTH 152H or LB 118) and (STT 201 or STT 231 or STT 421 or STT 296).

Conceptual and practical approaches to analyzing large functional datasets. Emphasis on statistical issues, including preprocessing, estimation methods, hypothesis testing, dimension reduction, and correlation with behavior. Data types include electrophysiological recording, electroencephalography (EEG), magnetoencephalography (MEG), functional Magnetic Resonance Imaging (fMRI) and optical imaging.

499 Neuroscience Senior Research Thesis On Demand. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. P: (NEU 490) and completion of Tier I writing requirement R: Open to seniors in the Neuroscience Major. Approval of department.

Independent research mentored by a neuroscience faculty member and conducted in their laboratory.

800 Neuroscience Research Forum Fall, Spring, Summer. 1(1-0) A student may earn a maximum of 8 credits in all enrollments for this course. RB: Bachelor's degree in neuroscience, biological or psychological science, or related area.

Readings, presentations, and discussions of research literature in neuroscience. Professional development.

801 Molecular, Cellular and Developmental Neuroscience I Fall. 3(3-0) RB: B.S., B.A. or M.S. degree in the biological or psychological sciences. R: Open to graduate students in the College of Natural Science or in the Program in Neuroscience or in the Neuroscience-Environment-Toxicology Major. Approval of department.

Genetics, molecular and cellular biology of the developing and the adult nervous system.

802 Systems and Behavioral Neuroscience I Fall. Spring. 3(3-0) RB: B.S., B.A. or M.S. in the biological or psychological sciences. R: Open to graduate students in the Program in Neuroscience. Approval of department.

Anatomy and physiology of multicellular neural systems controlling learning and memory, motivated behaviors, pain, biological rhythms and psychopathologies.

803 Molecular, Cellular and Developmental Neuroscience II Spring. 3(3-0) RB: B.S., B.A. or M.S. degree in the biological or psychological sciences. R: Open to graduate students in the Program in Neuroscience. Approval of department.

Electrical and intra- and extracellular signaling mechanisms of neurons and glia in health and disease in the developing and mature nervous system.

804 Molecular and Developmental Neurobiology Fall. 3(3-0) Interdepartmental with Integrative Biology and Pathobiology and Diagnostic Investigation and Pharmacology and Toxicology and Psychology. Administered by Neuroscience. RB: Bachelor's degree in a Biological Science or Psychology. R: Open to graduate students in Neuroscience major.

Nervous system specific gene transcription and translation. Maturation, degeneration, plasticity, and repair in the nervous system.

805 Systems and Behavioral Neuroscience II Spring. 3(3-0) RB: B.S., B.A. or M.S. in the biological or psychological sciences. R: Open to graduate students in the Program in Neuroscience or the Neuroscience-Environment-Toxicology Major. Approval of department.

Anatomy and physiology of multicellular, visual, auditory, motor, somatosensory and autonomic nervous systems.

807 Strategies in Neuroscience Research Fall. 2(2-0) RB: PHM 827 R: Open to graduate students in the Neuroscience Major.

Methods and underlying principles of neuroscience research.

811 Advanced Behavioral Neuroscience Spring. 3(3-0) Interdepartmental with Psychology. Administered by Psychology. RB: (PSY 411) or approval of department. R: Open only to graduate students in the Psychology major or Neuroscience major.

Biological mechanisms involved in learning and memory, motivated behaviors, biological rhythms, and psychopathologies.

815 Neuroinformatics and Quantitative Reasoning Fall. 3(3-0) R: Open to graduate students in the Medical Neuroscience Graduate Certificate or in the Neuroscience Major or in the Neuroscience-Environment-Toxicology Major. Approval of department.

Quantitative reasoning and statistical methods for querying internet databases and understanding basic neuroscience models for graduate students.

827 Physiology and Pharmacology of Excitable Cells Fall. 4(4-0) Interdepartmental with Integrative Biology and Pharmacology and Toxicology. Administered by Pharmacology and Toxicology. R: Open to graduate students in the College of Natural Science or in the Department of Pharmacology and Toxicology or approval of department.

Function of neurons and muscle at the cellular level: membrane biophysics and potentials, synaptic transmission, sensory nervous system function.

832 Evolution of Nervous Systems Spring of odd years. 3(3-0) Interdepartmental with Integrative Biology. Administered by Integrative Biology. RB: Background in neurobiology or evolutionary biology recommended. R: Open to graduate students in the Department of Computer Science and Engineering or in the Department of Integrative Biology or in the Program in Neuroscience or in the Department of Psychology or approval of department. SA: ZOL 832

Evolutionary origins, mechanisms, and consequences of evolutionary change in nervous systems.
839  Systems Neuroscience  
Spring. 4(4-0) Interdepartmental with Human Anatomy and Integrative Biology and Pharmacology and Toxicology and Physiology and Psychology. Administered by Neuroscience. R: Open to graduate students or human medicine students or osteopathic medicine students in the College of Natural Science or in the College of Agriculture and Natural Resources or in the College of Human Medicine or in the College of Osteopathic Medicine or in the College of Social Science or in the College of Veterinary Medicine. SA: ANT 839  
Anatomy, pharmacology, and physiology of multicellular neural systems. Sensory, motor, autonomic, and chemo-regulatory systems in vertebrate brains.

840  Social, Cognitive, and Affective Neuroscience  
Fall. 3(3-0) Not open to students with credit in NEU 839 or NEU 841.  
Introduction to nervous system structure and function aimed at students and professionals with limited biological science background.

841  Medical Neuroscience  
Fall, Spring. 3(3-0) RB: Undergraduate degree in the biological sciences R: Not open to doctoral students in the Program in Neuroscience. Not open to students with credit in NEU 802.  
Detailed survey of nervous system structure and function with an emphasis on medical applications.

842  Neuroethics  
Summer. 3(3-0) RB: (NEU 840 or concurrently) or (NEU 841 or concurrently)  
Introduction to the field of neuroethics and the responsible application of advances in neuroscience research.

843  Methods for Assessing the Nervous System  
Spring. 3(3-0) RB: (NEU 840 or concurrently) or (NEU 841 or concurrently)  
Introduction to the various techniques and methods used to study brain structure and function.

844  The Science and Ethics of Brain Interventions  
Summer. 2(2-0) RB: (NEU 840 or concurrently) or (NEU 841 or concurrently)  
Introduction to cognitive enhancement to improve intellect and cognition, and legal and ethical implications of this.

845  Neuroscience of Drug Use and Human Disorders  
Spring. 3(3-0) RB: NEU 840 or concurrently  
Introduction to the neurochemical basis of human disorders and how drugs are used to treat these disorders.

846  Neurobiology of Nervous System Disorders  
Summer. 3(3-0) RB: NEU 841 or concurrently R: Not open to doctoral students in the Program in Neuroscience.  
Overview of abnormalities that contribute to central nervous system, peripheral nervous system, and psychological diseases and disorders examined at genetic, cellular, and behavioral levels.

847  Development of the Nervous System  
Fall. 3(3-0) RB: NEU 841 or concurrently  
Introduction to processes involved in the development of the nervous systems and their clinical application.

848  Foundations of Law and Legal Research  
Fall, Spring, Summer. 2(2-0) R: Open to graduate students in the Program in Neuroscience. Approval of department. Not open to students with credit in LAW 807A.  
Introduction to the American legal system with focus on legal research and communication needs of non-lawyers.

890  Independent Study in Neuroscience  
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 12 credits in all enrollments for this course. R: Not open to doctoral students in the Program in Neuroscience.  
Supervised student research on a specialized research topic in basic or clinical neuroscience.

892  Special Topics in Neuroscience and the Law  
Fall. 1 to 3 credits. A student may earn a maximum of 4 credits in all enrollments for this course. RB: NEU 840 or concurrently  
Topics in which the field of neuroscience and the legal system intersect.

899  Master’s Thesis Research  
Fall, Spring, Summer. 1 to 36 credits. A student may earn a maximum of 99 credits in all enrollments for this course.  
Master’s thesis research.

992  Advanced Topics in Neuroscience  
Fall, Spring. 1 to 3 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Bachelor’s degree in neuroscience, biology, psychology, or related area.  
Readings, presentations and discussion of specialized topics in neuroscience.

999  Doctoral Dissertation Research  
Fall, Spring. 1 to 24 credits. A student may earn a maximum of 36 credits in all enrollments for this course.  
Doctoral dissertation research.