

NEUROSCIENCE (NSC)

Graduate Studies

NSC 200LA – Laboratory Methods in Neurobiology (6 units)

Course Description: Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design.

Prerequisite(s): Graduate standing in the Neuroscience Graduate Group.

Learning Activities: Laboratory 18 hour(s).

Repeat Credit: May be repeated 3 time(s).

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 200LB – Laboratory Methods in Neurobiology (3 units)

Course Description: Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design.

Prerequisite(s): Graduate standing in the Neuroscience Graduate Group.

Learning Activities: Laboratory 9 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 201 – Neuroanatomy (3 units)

Course Description: Mix of lectures, demonstrations, and dissections, emphasizing functional significance of neuroanatomy from a biological perspective, with comparisons between human and non-human brains. Emphasis placed on functional anatomy of the nervous system, integrated with cellular, molecular, cognitive, and developmental concepts.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture 2 hour(s), Discussion/Laboratory 1 hour(s).

Grade Mode: Letter.

NSC 211 – Advanced Topics in Neuroimaging (3 units)

Course Description: Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG.

Prerequisite(s): PSC 210; or consent of instructor.

Learning Activities: Seminar 2 hour(s), Laboratory 1 hour(s).

Enrollment Restriction(s): Restricted to 16 students.

Repeat Credit: May be repeated when topic differs.

Cross Listing: NPB 211, PSC 211.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 219 – Design to Data: Statistics for Modern Neuroscience (4 units)

Course Description: Statistical methods and applications for neuroscience. Quantitative foundations covering key concepts, methods, and applications, from descriptive analysis through data science. Statistical considerations in experimental design, analysis and statistical testing in hypothesis and data-driven contexts, and responsible conduct of research in the acquisition, storage, analysis, and presentation of scientific data.

Prerequisite(s): Graduate student standing in neuroscience or related discipline or consent of instructor.

Learning Activities: Lecture 4 hour(s).

Grade Mode: Letter.

NSC 220 – How to Give a Scientific Seminar (3 units)

Course Description: Presentation of effective seminars. Student presentations of selected neuroscience topics in seminar format. Must be taken in two consecutive quarters.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture/Discussion 3 hour(s).

Repeat Credit: May be repeated 1 time(s).

Grade Mode: Letter.

NSC 221 – Cellular Neurophysiology (4 units)

Course Description: Physiological aspects of cellular and subcellular organization of the nervous system. Neuronal cell biology, the structure and function of ion channels, electrical excitability, signaling cascades, sensory transduction and, mechanisms of synaptic transmission, and the cellular basis of learning and memory.

Prerequisite(s): Graduate standing or consent of instructor.

Learning Activities: Lecture 4.50 hour(s).

Grade Mode: Letter.

NSC 222 – Systems Neuroscience (5 units)

Course Description: Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory.

Prerequisite(s): Graduate standing or consent of instructor.

Learning Activities: Lecture 4 hour(s), Discussion 1 hour(s).

Cross Listing: NPB 222.

Grade Mode: Letter.

NSC 223 – Cognitive Neuroscience (4 units)

Course Description: Graduate core course for neuroscience.

Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence.

Prerequisite(s): Graduate student standing in Psychology or Neuroscience or consent of instructor.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Cross Listing: PSC 261.

Grade Mode: Letter.

NSC 224A – Molecular & Developmental Neurobiology (2 units)

Course Description: Key issues in developmental and molecular neurobiology. Discussion emphasis on critical evaluation of the experiments and methods described in research papers. Readings of seminal, primary research papers, reviews, and book chapters. Reading materials will be distributed one week in advance.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture/Discussion 2 hour(s).

Grade Mode: Letter.

NSC 224B – Molecular & Developmental Neurobiology (2 units)

Course Description: Continuation of NSC 224A. Key issues in developmental and molecular neurobiology, focusing on developmental topics. Discussion emphasis on critical evaluation of experiments and methods described in associated literature.

Prerequisite(s): NSC 224A; or consent of instructor.

Learning Activities: Lecture/Discussion 2 hour(s).

Grade Mode: Letter.

NSC 225 – Translational Research in the Neurobiology of Disease (2 units)

Course Description: Provides an overview of major neuropsychiatric and neurological disorders from both the clinical and fundamental science perspectives.

Prerequisite(s): NSC 221 (can be concurrent); NSC 222 (can be concurrent); NSC 223 (can be concurrent); or consent of instructor; past or concurrent enrollment in NSC 221 NSC 222 NSC 223.

Learning Activities: Lecture 1 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

NSC 226 – Molecular & Developmental Neurobiology (4 units)

Course Description: Key issues in developmental and molecular neurobiology. Topics include neural induction and patterning, neurogenesis, axon guidance, synapse development and remodeling. Discussion emphasis on critical evaluation of the experiments and methods described in primary seminal research papers and current literature.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture/Discussion 4 hour(s).

Grade Mode: Letter.

NSC 243 – Topics in Cellular & Behavioral Neurobiology (2 units)

Course Description: An advanced examination of several current problems in neurobiology. Topics vary in different years.

Prerequisite(s): Consent of instructor.

Learning Activities: Discussion 1 hour(s), Seminar 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 247 – Topics in Functional Neurogenomics (2 units)

Course Description: The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system.

Prerequisite(s): Graduate standing or consent of instructor.

Learning Activities: Lecture 1 hour(s), Discussion 1 hour(s).

Cross Listing: NPB 247.

Grade Mode: Letter.

NSC 250 – Biology of Neuroglia (2 units)

Course Description: The properties and functions of non-neuronal or neuroglial cells in the mammalian central nervous system with relevance to neuronal development, physiology and injury response.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture/Discussion 1.50 hour(s).

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 261A – Topics in Vision: Eyes & Retinal Mechanisms (2 units)

Course Description: Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing.

Prerequisite(s): NPB 100 or NPB 112; or the equivalent; graduate standing.

Learning Activities: Lecture/Discussion 2 hour(s).

Cross Listing: NPB 261A, MCP 261A.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 261B – Topics in Vision: Systems, Psychophysics, Computational Models (2 units)

Course Description: Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system.

Prerequisite(s): Consent of instructor; NSC 261A recommended.

Learning Activities: Lecture/Discussion 2 hour(s).

Cross Listing: NPB 261B, MCP 261B.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 261C – Topics in Vision: Clinical Vision Science (2 units)

Course Description: Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease.

Prerequisite(s): NSC 261A; NSC 261B; or consent of instructor.

Learning Activities: Lecture/Discussion 2 hour(s).

Cross Listing: NPB 261C, MCP 261C.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 267 – Computational Neuroscience (5 units)

Course Description: Mathematical models and data analysis techniques used to describe computations performed by nervous systems.

Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB.

Prerequisite(s): Consent of instructor; one course in general Neuroscience at the level of NSC 100; or NPB 110B; one year college-level Calculus at level of MAT 016A, MAT 016B, MAT 016C or higher; one year Physics at the level of PHY 007A, PHY 007B, PHY 007C, recommended; or consent of instructor.

Learning Activities: Lecture 4 hour(s), Lecture/Lab 3 hour(s).

Cross Listing: NPB 267.

Grade Mode: Letter.

NSC 270 – How to Write a Fundable Grant Proposal in the Biomedical Sciences (2 units)

Course Description: Teaches the do's and don'ts of writing grants in the biomedical sciences and the mechanisms of the review process.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture/Discussion 2 hour(s).

Enrollment Restriction(s): Restricted to members of the Neuroscience and BMCDB graduate groups; graduate students in other biomedical programs may enroll with instructor permission.

Repeat Credit: May be repeated.

Cross Listing: NPB 270.

Grade Mode: Letter.

NSC 271A – Core Concepts & Methods in Learning, Memory, & Plasticity (2 units)

Course Description: Core concepts and methods used in studies of learning, memory and plasticity. Behavioral paradigms and measurement approaches in human and animal studies of learning and plasticity, as well as a consideration of the functional, anatomical and neuronal mechanisms underlying brain plasticity.

Prerequisite(s): Graduate Standing or consent of instructor.

Learning Activities: Lecture/Discussion 2 hour(s).

Cross Listing: PSC 271A, NPB 271A.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 271B – Core Concepts & Methods in Learning, Memory, & Plasticity (2 units)

Course Description: Core concepts and detailed survey methods used in studies of learning, memory and plasticity, from the cellular and molecular level to the level of neural circuits. Areas of learning, memory, and plasticity research where recent progress has been made in linking across these levels of analysis.

Prerequisite(s): NSC 271A or NPB 271A or PSC 271A.

Learning Activities: Lecture/Discussion 2 hour(s).

Cross Listing: PSC 271B, NPB 271B.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 271C – Translational Approaches to Learning, Memory, & Plasticity Disorders (2 units)

Course Description: Neurological disorders, the effect of these disorders on learning, memory and plasticity, approved therapeutic options and current research designed to improve understanding and treatment of these diseases: (i) the clinical presentation, diagnostic criteria, and existing therapies, (ii) mechanistic studies in humans and animal models, and (iii) molecular pathways involved in the disease and approaches for drug discovery.

Prerequisite(s): NSC 271B or NPB 271B or PSC 271B.

Learning Activities: Lecture/Discussion 2 hour(s).

Cross Listing: PSC 271C, NPB 271C.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 283 – Neurobiological Literature (1 unit)

Course Description: Critical presentation and analysis of recent journal articles in neurobiology.

Prerequisite(s): Consent of instructor.

Learning Activities: Seminar 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 284 – Development of Sensory Systems (1 unit)

Course Description: Presentation and discussion of recent literature on the development of sensory systems.

Prerequisite(s): Consent of instructor.

Learning Activities: Seminar 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 285 – Literature in Visual Neuroscience (2 units)

Course Description: Critical presentation and discussion of current literature in visual neuroscience.

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated when topic differs.

Cross Listing: NPB 285.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 286 – Frontiers in Biology of Glia (1 unit)

Course Description: Frontiers of glial biology. Research articles in current literature on experimental approaches, technical aspects of experimental techniques, data interpretation, and other topics.

Prerequisite(s): Consent of instructor.

Learning Activities: Seminar 3 hour(s).

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 287A – Topics in Theoretical Neuroscience (2 units)

Course Description: In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture/Discussion 2 hour(s).

Repeat Credit: May be repeated.

Cross Listing: NPB 287A.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 287B – Topics in Theoretical Neuroscience (2 units)

Course Description: In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature.

Prerequisite(s): Consent of instructor.

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated.

Cross Listing: NPB 287B.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 289 – Topics in Molecular & Developmental Neurobiology (2 units)

Course Description: Analysis and discussion of seminal and current research papers in molecular and developmental neurobiology. Different topics will be covered each quarter. In the past topics have included, "Synaptic vesicle dynamics," "Neuronal polarity," and "Glutamate receptors."

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated 10 time(s) when topic differs.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 290C – Research Conference in Neurobiology (1 unit)

Course Description: Presentation and discussion of faculty and graduate student research in neurobiology.

Prerequisite(s): NSC 299 required concurrently; graduate standing in Neuroscience or consent of instructor.

Learning Activities: Discussion 1 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 292 – Cortical Plasticity & Perception (2 units)

Course Description: Examination of research articles on cortical plasticity and changes in perception. Examples drawn from studies of the somatosensory, visual, auditory, and motor cortex.

Prerequisite(s): NPB 100 or NPB 112; or equivalent or consent of instructor.

Learning Activities: Lecture/Discussion 2 hour(s).

Repeat Credit: May be repeated.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 295 – Literature in Neuroengineering (2 units)

Course Description: Critical presentation and discussion of current literature in neuroengineering.

Learning Activities: Seminar 2 hour(s).

Enrollment Restriction(s): Open to graduate students only.

Repeat Credit: May be repeated.

Cross Listing: BIM 295.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 298 – Group Study (1-5 units)

Course Description: Group study.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.

NSC 299 – Research (1-12 units)

Course Description: Research.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.