NEUROSCIENCE TRAINING PROGRAM (NTP)

NTP/PHYSIOL/PSYCH/ZOOLOGY 524 — NEUROBIOLOGY II: AN INTRODUCTION TO THE BRAIN AND BEHAVIOR
3 credits.

An introduction to studies of the human nervous system covering neuroanatomy of the brain, neuronal coding, sensory and motor systems, biological rhythms, arousal, attention, physiological regulation, reward, aversion, learning and memory.

Requisites: Zool 523, equiv crse in physiol, or cons inst
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2016

NTP/PHMCOL-M/PHYSIOL 610 — CELLULAR AND MOLECULAR NEUROSCIENCE
4 credits.

Study of original papers leading to an understanding of the molecular basis of electrical activity in neurons. Topics include voltage-sensitive currents, molecular biology of neuronal receptors, synaptic transmission and sensory transduction. Lectures supplemented with experimental demonstrations and discussion sessions.

Requisites: Zoo 523 or equiv
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2017

NTP/ANATOMY/PHYSIOL/PSYCH/ZOOLOGY 611 — SYSTEMS NEUROSCIENCE
4 credits.

Introduction to the anatomy and physiology of the mammalian nervous system. Lectures will cover the neuroanatomy of the major subdivisions of the human brain, the major sensory and motor systems, and higher order functions. Lab/discussion sections will emphasize readings from the primary literature and hands-on dissections.

Requisites: PHYSIOL/NTP/PHMCOL-M 610
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2017

NTP/PHYSIOL/PSYCH/ZOOLOGY 616 — LAB COURSE IN NEUROBIOLOGY AND BEHAVIOR
4 credits.

Students will do three independent experimental modules exploring neurophysiology and behavior, each taking 4-5 weeks. Students will work in groups of 2 or 3 and will learn techniques and then develop their own short investigations into each of three separate areas of neurobiology. There will be continual interaction between students and faculty.

Requisites: ZOOLOGY/NTP/PSYCH/ZOOLOGY 523 and NTP/PHYSIO / PSYCH/ZOOLOGY/NTP/PHYSIOL/PSYCH 524 or NTP/PHMCOL-M/ PHYSIOL/NTP/PHMCOL-M 610 and ANATOMY/NTP/PHMCOL-M/ PHYSIOL/PSYCH/ANATOMY/NTP/PHMCOL-M/PHYSIOL 611
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2017

NTP/ANTHRO/PSYCH/ZOOLOGY 619 — BIOLOGY OF MIND
3 credits.


Requisites: Jr st; college level elem crse in biology or psych
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2012

NTP/ZOOLOGY 620 — NEUROETHOLOGY SEMINAR
2 credits.

A group discussion of primary literature articles relevant to the neural basis of behavior with a purpose to understand the neural basis of behavior in animals, to learn to read papers critically and improve discussion leading skills. Background in neuroscience strongly recommended.

Requisites: Introductory biology
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2012

NTP/ANATOMY/PHYSIOL 625 — BRAIN CELL CULTURES AND IMAGING: A LAB COURSE
4 credits.

Hands-on laboratory training in neuronal cell culture, live and fixed neuron labeling and microscopy techniques to visualize neurons in culture, as well as image analysis methods. Enrollment limited to 12 students, authorized by cons inst

Requisites: Intro crses in biochem, cell biology anatomy.
Course Designation: L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Fall 2013
NTP/PHYSIOL 629 — MOLECULAR AND CELLULAR MECHANISMS OF MEMORY
3 credits.

Course will focus on the cell signaling and the resulting structural changes that occur at neuronal synapses during memory formation. The aim is to understand how the synaptic changes underlying memory occur.

**Requisites:** Crse in cellular neurosci (Neurosci 523 or equiv); BIOCHEM 501 or equiv

**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

**Level - Advanced**

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2016

NTP/ANATOMY/PHYSIOL 630 — NEURONAL MECHANISMS FOR SENSATION AND MEMORY IN CEREBRAL CORTEX
3 credits.

Current literature will be considered in lectures and discussions that provide insight into how the cerebral cortex processes sensory information to generate and store cogent representations of the external world. The course includes laboratory exercises and demonstrations.

**Requisites:** Intro neurosci crse highly recommended: Neurosci/Anat/Phmcol/PHYSIOL/ANATOMY/NTP/PHMCOL-M/PSYCH 611, MED SC-M 731, COMP BIO 505, Zool/Neurosci/PSYCH/ZOOLOGY 523, Psych/Neurophy/Neurosci/Zool 524; or cons inst

**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2017

NTP/ZOOLOGY 635 — NEUROBIOLOGY OF DISEASE
2 credits.

Seminar course relating major categories of human neurological and ophthalmological disease to fundamental topics in neurobiology.

**Requisites:** Zool/Neurosci 523 524 or cons inst

**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2017

NTP/MED PHYS 651 — METHODS FOR NEUROIMAGING RESEARCH
3 credits.

Provides a practical foundation for neuroimaging research studies with statistical image analysis. Specific imaging methods include functional BOLD MRI, structural MRI morphometry, and diffusion tensor imaging. Lectures and associated in-class computer exercises will cover the physics and methods of image acquisition, steps and tools for image analyses, the basis for statistical image analyses and interpretation of the results.

**Requisites:** Junior standing

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Spring 2017

NTP 655 — MODELING NEURODEVELOPMENTAL DISEASE
3 credits.

This course will systematically explore current animal models of human diseases that affect the central nervous system. Topics will include birth defects that disrupt normal brain architecture (holoprosencephaly and neural tube closure defects), birth defects affecting the visual system, and postnatal disease, e.g. neurodegeneration and stroke. This course is designed for graduate and advanced undergraduate students.

**Requisites:** Graduate standing or BOTANY/GENETICS/ZOOLOGY 466, ZOOLOGY 470, NTP/PSYCH/ZOOLOGY/PSYCH 523, or ZOOLOGY 570

**Course Designation:** Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** No

**Last Taught:** Fall 2017

NTP 660 — NEUROSCIENCE & PUBLIC POLICY SEMINAR
1-2 credits.

A graduate level seminar open to advanced undergraduates with consent of instructor. Covers various topics in neuroscience and in the related sciences in lectures that demonstrate the interaction between science and public policy. Grad st in the Neuroscience Training Program or in the Neuroscience and Public Policy Program

**Requisites:** Undergraduates: a background in neuroscience, (ZOOLOGY/PSYCH 523 and 524, or Biocore 323 or Neurosci 610 and 611).

**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement

**Repeatable for Credit:** Yes, unlimited number of completions

**Last Taught:** Fall 2017
NTP 670 — STEM CELLS AND THE CENTRAL NERVOUS SYSTEM  
2-3 credits.

Among the topics that will be included in the course are: embryonic stem cells, adult stem cells, and the transplantation of embryonic and adult stem cell to the developing and adult CNS for experimental and therapeutic purposes. Grad stdts in the sciences or adv undergrads with cons inst. 
Requisites: BIOCHEM 501 or equiv.  
Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req  
Level - Advanced  
L&S Credit - Counts as Liberal Arts and Science credit in L&S  
Grad 50% - Counts toward 50% graduate coursework requirement  
Repeatable for Credit: No  
Last Taught: Spring 2013

NTP 675 — SPECIAL TOPICS  
1-3 credits.  
Requisites: Variable  
Course Designation: Level - Advanced  
L&S Credit - Counts as Liberal Arts and Science credit in L&S  
Grad 50% - Counts toward 50% graduate coursework requirement  
Repeatable for Credit: Yes, unlimited number of completions  
Last Taught: Fall 2017

NTP 681 — SENIOR HONORS THESIS  
3 credits.  
Research and thesis in neuroscience.  
Requisites: Consent of instructor  
Course Designation: Level - Advanced  
L&S Credit - Counts as Liberal Arts and Science credit in L&S  
Honors - Honors Only Courses (H)  
Repeatable for Credit: No  
Last Taught: Fall 2017

NTP 682 — SENIOR HONORS THESIS  
3 credits.  
Continuation of 681.  
Requisites: Neurosci 681, cons inst  
Course Designation: Level - Advanced  
L&S Credit - Counts as Liberal Arts and Science credit in L&S  
Honors - Honors Only Courses (H)  
Repeatable for Credit: No  
Last Taught: Fall 2017

NTP 691 — UNDERGRADUATE THESIS  
3-6 credits.  
Research and thesis in neuroscience.  
Requisites: Consent of instructor  
Course Designation: Level - Advanced  
L&S Credit - Counts as Liberal Arts and Science credit in L&S  
Repeatable for Credit: No  
Last Taught: Fall 2017

NTP 692 — UNDERGRADUATE THESIS  
3-6 credits.  
Continuation of 691.  
Requisites: Consent of instructor  
Course Designation: Level - Advanced  
L&S Credit - Counts as Liberal Arts and Science credit in L&S  
Repeatable for Credit: No  
Last Taught: Spring 2017

NTP 699 — DIRECTED STUDY IN RESEARCH  
1-6 credits.  
Directed research in neuroscience.  
Requisites: Consent of instructor  
Course Designation: Level - Advanced  
L&S Credit - Counts as Liberal Arts and Science credit in L&S  
Repeatable for Credit: Yes, unlimited number of completions  
Last Taught: Fall 2017

NTP/PHYSIOL 700 — PROFESSIONAL DEVELOPMENT FOR BIOMEDICAL GRADUATE STUDENTS  
1 credit.  
Provides graduate students with the skills and knowledge necessary to succeed in science. Topics which are covered include choosing a thesis advisor, grant writing, preparing a seminar presentation, etc.  
Requisites: Graduate or professional standing  
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement  
Repeatable for Credit: No  
Last Taught: Fall 2017

NTP/ANATOMY/ZOOLOGY 765 — DEVELOPMENTAL NEUROSCIENCE  
3 credits.  
Analysis of neural development with emphasis on experimental approaches. Combination of lectures and discussions of primary literature. Topics include neural induction, patterning, mechanisms of axon guidance, neural crest cell migration and differentiation, cortical development, and synapse formation and elimination.  
Requisites: Grad st in biol sci; undergrads with cons inst  
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement  
Repeatable for Credit: No  
Last Taught: Spring 2016
NTP 777 — BASIC SLEEP MECHANISMS AND SLEEP DISORDERS: FROM NEUROBIOLOGY TO SLEEP MEDICINE
3 credits.

Sleep occupies a third of our life, is found in all animal species carefully studied so far, and loss of sleep has both acute and long-term negative consequences on the brain and the body. Still, why we sleep remains unclear, and hypotheses on the role of sleep for synaptic homeostasis, learning and memory are being tested. Lectures will focus on the neurobiology of sleep, with detailed review of the brain structures involved in controlling wake and sleep, as well as the circadian and homeostatic regulation of sleep. Other topics will include changes in sleep need with age, animal models to study sleep, sleep disorders, and genetics of sleep.

**Requisites:** Graduate or professional standing  
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement  
**Repeatable for Credit:** No

NTP 900 — NEUROSCIENCE SEMINAR: CURRENT TOPICS IN NEUROBIOLOGY  
1 credit.

Critical review of selected topics in neurobiology.  
**Requisites:** Cons inst  
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement  
**Repeatable for Credit:** Yes, unlimited number of completions  
**Last Taught:** Fall 2017

NTP 990 — RESEARCH AND THESIS
1-12 credits.

**Requisites:** Grad st in Neurosci  
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement  
**Repeatable for Credit:** Yes, unlimited number of completions  
**Last Taught:** Fall 2017

NTP 999 — ADVANCED INDEPENDENT STUDY
1-3 credits.

**Requisites:** Consent of instructor  
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement  
**Repeatable for Credit:** Yes, unlimited number of completions  
**Last Taught:** Fall 1995