

NEUROSCIENCE (NEUR)

The courses listed on this page are exclusive to the LPS BAAS degree (<https://lpsonline.sas.upenn.edu/features/what-bachelor-applied-arts-and-sciences-degree/>) and LPS Online certificates (<https://lpsonline.sas.upenn.edu/academics/certificates/>).

NEUR 1000 Introduction to Neuroscience

This course serves as an introduction to the structure and function of the vertebrate nervous system. We begin the course with the study of nerve cells: their basic structure, how they establish and maintain the resting membrane potential, how they propagate an action potential, and how they transfer information via the process of neurotransmission. We next move into an investigation of the anatomy of the central nervous system (brain and spinal cord) with an emphasis on neurodevelopment. With the above knowledge in hand, we move into the sensory systems and investigate smell, hearing, vision, and pain sensation by focusing on how physical stimuli (such as sound waves) are converted into neural signals, where these signals travel in the brain, and how they are processed. We finish the course with an investigation into the function of the various motor systems and the autonomic nervous system. When you register for NEUR 1000, you are automatically enrolled in a mandatory neuroscience learning assessment to gauge your prior knowledge of biology and chemistry and help prepare you for the course. The learning assessment can be found in Canvas and must be completed before NEUR 1000 begins; it is recommended that you begin the learning assessment at least a week in advance. This learning assessment helps you get familiarized with baseline knowledge that you need before beginning the course and enables all students to begin the course with the same baseline knowledge. Completing the assessment accurately takes 2-10 hours. You can review the materials as many times as you want. We encourage you to earn a passing score in this assessment to be successful in completing the NEUR 1000 course. If you are unable to pass this assessment successfully, you can still remain in the course, but we recommend that you consult with your advisor about next steps. Example topics in this self-assessment: Biology: transport across a membrane, gene expression Chemistry: diffusion, electrical properties of ions Physics: Ohm's Law, capacitance This course requires the textbook *Neuroscience: Exploring the Brain* (4th Edition, 2015) by Mark Bear, PhD; Barry Connors, PhD; Michael A. Paradiso, PhD (ISBN-10: 0781778174). You have the option to enroll in this individual course without committing to the entire Certificate in Neuroscience, enjoying the flexibility and expertise offered by Penn LPS Online to suit your schedule and interests. BAAS students, certificate students, and those taking individual courses must first complete NEUR 1000 before enrolling in additional neuroscience courses.

1 Course Unit

NEUR 1600 The Neuroscience of Music

NEUR 1000 is the pre-requisite course for all Penn LPS Online Neuroscience courses. Music is a biological mystery: a ubiquitous human behavior with no obvious value for survival. Why do all human cultures have music? What accounts for the common threads running through the world's music? We look for answers by looking at the auditory system: the ear and especially the brain, in humans and in animals. Topics like musical universals, consonance and dissonance, scale structure, music, and emotion, music theory, talent, and improvisation are greatly illuminated by thinking about their neurobiological foundations. You have the option to enroll in this individual course without committing to the entire Certificate in Neuroscience, enjoying the flexibility and expertise offered by Penn LPS Online to suit your schedule and interests. BAAS students, certificate students, and those taking individual courses must first complete NEUR 100 before enrolling in this course.

Prerequisite: NEUR 1000

1 Course Unit

NEUR 2000 Behavioral Neuroscience

NEUR 1000 is the pre-requisite course for all Penn LPS Online Neuroscience courses. An introduction to the experimental analysis of natural animal behavior and its neurobiological basis. Behavior is examined in an evolutionary and ecological context, and questions are focused on the neural processes that allow animals to carry out critical activities such as locating prey and finding mates. The course is comparative and strives to identify common principles in sensory and motor processing and brain function.

Prerequisite: NEUR 1000

1 Course Unit

NEUR 2600 Hormones, Brain, Behavior

NEUR 1000 is the pre-requisite course for all Penn LPS Online Neuroscience courses. This course aims to introduce students to important interactions between the brain, behavior, and endocrine systems. Students learn about diverse vertebrate species, a variety of physiological systems, and the molecular mechanisms of hormone action. The specific neuroendocrine systems to be studied include reproduction, social bonding, fluid and energy balance, and emotional regulation. In addition, students develop skills required for critical reading of primary neuroscience literature and scientific communication.

Prerequisite: NEUR 1000

1 Course Unit

NEUR 2800 Autonomic Pharmacology

NEUR 1000 is the pre-requisite course for all Penn LPS Online Neuroscience courses. In this course, students learn how the central nervous system regulates the activity of peripheral tissues to maintain homeostasis in the body. Output from the autonomic nervous system affects a variety of physiological parameters, including blood glucose levels, blood pressure, and ingestive behaviors. Students then apply the knowledge of the autonomic outflow to understand the actions of a variety of classes of drugs, including those prescribed for diabetes, hypertension, and other conditions.

Prerequisite: NEUR 1000

1 Course Unit

NEUR 4000 Psychopharmacology

NEUR 1000 is the pre-requisite course for all Penn LPS Online Neuroscience courses. Students examine drugs used in the treatment of central nervous system (CNS) dysfunction, including psychiatric diagnoses and neurodegenerative diseases. Explore the strategies, techniques, and challenges of psychopharmacological research and the use of drugs to probe neural substrates of behavior. Introductory material will be followed by advanced discussion of specific topics through the reading and discussion of primary journal articles.

Prerequisite: NEUR 1000

1 Course Unit