ME.440 (NEUROSCIENCE)

Courses

ME.440.696. Research Elective in Neuroscience.

ME.440.699. Neuroscience Elective.

ME.440.705. Cellular and Molecular Basis of Neural Development II. 1.5 Credits.
This is a seminar and reading course devoted to the discussion of the cellular and molecular processes underlying neuronal development.

ME.440.707. Molecular Mechanisms in Synaptic Transmission. 2 Credits.
An advanced seminar and reading course devoted to the molecular and cellular mechanisms underlying synaptic transmission and the regulation of synaptic plasticity. We will discuss fundamental discoveries in th eareas of synapse formation, transmitter release, vesicle recycling, ribbon synapses, dendritic modulation, LTP/LTD, and homeostatic regulation. Students will present two papers and provide written answers to questions about the assigned reading.

ME.440.709. Neuropharmacology. 1.5 Credits.
The course will illustrate the use of diverse approaches (molecular, biochemical, electrophysiological and behavioral) to decipher how psychotropic drugs impact the brain. The course will utilize a lecture format for the first two classes and then switch to a “journal club” format in which students will present classic and recent articles. Topics to be covered include: opiates, benzodiazepines, antipsychotic drugs, and antidepressant drugs.

ME.440.711. Cellular and Molecular Basis of Neural Development I: Neuronal Differentiation. 1.5 Credits.
A seminar and reading course devoted to the discussion of the cellular and molecular processes underlying neuronal development. Topics include cell proliferation and migration, nervous system patterning, differentiation of neurons and glia, morphogen and growth factor signaling mechanisms, neuronal polarity, and neural stem cell biology. Examples from vertebrate and invertebrate model systems will be covered. This course is designed to complement The Cellular and Molecular Basis of Neural Development II: Axon Guidance and Synaptogenesis, offered alternate years.

ME.440.715. Trends in the Neurobiology of Aging. 0.5 Credits.
This course will reveiw recent research progress in the fields of agin and neurodegenerative disorders with coverage of cellular, moleular, and systems neuroscience.

ME.440.718. Neurobiology. 1 Credit.
This course provides a comprehensive introduction to cellular and molecular neurobiology. Areas covered by the basic science faculty include the following: Neural development (cell specification, differentiation, axon guidance, synapse formation), Cellular electrophysiology (ionic conductances, resting potential, action potentials), Molecular biology of synaptic transmission (neurotransmitters and receptors), Sensory transduction (phototransduction, other sensory systems), Synaptic plasticity (mechanisms of synapse modification), Cellular basis of neurological and psychiatric disorders.

ME.440.723. Writing About the Brain. 3 Credits.
The goal of this course is to train working neuroscientists to effectively and clearly communicate ideas aboout nervous system function of a general audience

ME.440.724. Neuroscience Career Skills. 1 Credit.
This course is intended to help graduate students in the Neuroscience Graduate Program obtain an appreciation of options, challenges, and steps towards careers in the field of neuroscience.

ME.440.728. Brain Diseases: Neurodegenerative Diseases. 2 Credits.
The course will provide an in-depth examination of the biology of the classic neurodegenerative diseases such as Huntington’s disease, Parkinson’s disease, ALS and Alzheimer’s disease, and other diseases may be considered depending on student and faculty interest.

ME.440.730. Submitting Your First Paper. 0.5 Credits.
This course is taught by Neuroscience Training Program faculty and provide "how to" training and guidance to second year Neuroscience students.This course covers: knowing when you are ready to write, getting started, writing transparent methods, generating figures, writing an effective discussion section, citation manager, writing for rigor and reproduciblity, choosing appropriate statistics, how to choose a journal, peer review, and how to respond to reviews.

ME.440.731. How to Give a Scientific Talk. 1 Credit.
Clear communication is always important. For academia, this does not only include scientific publications, but also the ability to deliver clear, concise (and hopefully engaging) scientific talks. This course is explicitly for students who have at least one year of research experience in a neuroscience-related lab, and a data set or project of their own that they can present. The goal of the course is to set you up for your future academic career. Note that this class will be a shared class for undergraduates and graduate students from the neuroscience department. We will discuss the building blocks of how to give a good talk, and then practice these skills by giving a short (interview style) presentation without slides, as well as 2 longer presentations with slides. One of the most crucial aspects of this course is the feedback provided after each talk – most of which is expected to come from the students. The quality of the class, and how much everyone ultimately benefits from it, therefore depends on everyone’s active participation. To make that easier, the actual talk delivery will not be graded. The grade instead is based on your abstracts (one per talk), the preparation for each talk, as well as your level of participation. This class should be a great opportunity not just to learn how deliver a talk, but also learn about some of the cool science going on at Hopkins! Because participation is an important part of the class, attendance at every session is required. Enrollment restricted to Year 2 and above students.

ME.440.800. Neuroscience Research. 1 - 18 Credits.
Research in Neuroscience.

ME.440.801. Readings in Neuroscience (Journal Club). 1 Credit.
A weekly talk on current literature topics of special interest. Students present either journal articles or their own research depending on their year in the program.

ME.440.802. Current Topics in Neuroscience (Research Seminar). 1 Credit.
Weekly lecture on current research by active researchers. Topics are chosen so that an overall balance of subjects in neuroscience are covered in the course of a year. Students receive a reading list before the seminar and will be given an opportunity to meet with outside speakers.

ME.440.803. Teaching in Neuroscience. 1 Credit.
TBD

ME.440.804. Directed Readings in Neuroscience.
Independent course work, directed by assigned faculty member.

ME.440.808. Physiology of Visual and Olfactory Transductions. 1.5 Credits.

ME.440.810. Readings In Systems Neuroscience. 1 Credit.
A weekly talk on current literature topics of special interest. Students present journal articles for discussion.

ME.440.811. Neuroscience Cognition I. 4.5 Credits.
This is the first half of a 4-quarter course on the cellular and molecular basis of neural function adn the neural basis of perception, cognition, and behavior. Topics covered in this half include (1) development and structure of the nervous system, (2) cellular neurophysiology, (3) neural signaling and coding, and (4) audition, vocalization, and language. Lectures will be presented by faculty in the Neuroscience, Neurology, Biomedical Engineering, Psychology, and Cognitive Science departments. The course will also include discussion sections based current literature and several neurotechniques sessions designed to familiarize student with current experimental approaches in cellular, systems and molecular neurosciences. This course is required of all students in the Neuroscience Graduate Program.

ME.440.812. Neuroscience Cognition II. 4.5 Credits.
This is the second half of a 4-quarter course on the cellular and molecular basis of neural function and the neural basis of perception, cognition, and behavior. Topics covered in this half include (1) perception of objects, space, and self, (2) movement and balance, (3) learning and memory, (4) neurological and psychiatric disorders, and (5) global function in the nervous system. Lectures will be presented by faculty in the Neuroscience, Neurology, Biomedical Engineering, Psychology, and Cognitive Science Departments. The course will also have a laboratory component. This course is required of all students in the Neuroscience Graduate Program.

ME.440.813. Current Issues in Systems and Cognitive Neuroscience. 1 Credit.
The mammalian brain is an information processing system without parallel. It excels at recognizing objects and substances, reconstructing space, making decisions, and controllig complex behaviors. The neural mechanisms underlying these abilities are studied by a large community of systems and cognitive neuroscientists. This research has generated a rapidly evolving field of high-profile discoveries and lively debates between competing laboratories. Our course aims to convey a clear sense of this field by focusing on current experimental and conceptual controversies regarding organization and function in the primate nervous system. Each week will focus on a different topic represented by two or more recent papers (selected by an instructor) reflecting timely questions or opposing points of view. Students will present the papers informally and direct a debate over the relative merits of hte conflicting view points.

ME.440.814. Research in Neuroscience (BCMB). 1 - 18 Credits.
Laboratory Research

ME.440.817. Psychedelics.
In this course we will explore the history and uses of psychoactive compounds, the neurobiological basis of their activity, and their potential for healing. Along the way we will attempt to debunk some of the most common myths about this especially controversial class of drugs. Each session, one student will take the lead in discussing the assigned primary research articles (except for 2-3 documentary film sessions, which will take up the whole period). Beyond didactic learning, this graduate level course is designed to hone students' skills in oral presentations, critical thinking, as well as composition and editing of manuscripts.

ME.440.818. Bioenergetics, Neuroplasticity and Brain Health. 1 Credit.
Overindulgent sedentary lifestyles are increasingly common with adverse consequences for trajectories of brain health in current and future generations. This course will review findings from studies of humans and animals that are elucidating the cellular and molecular mechanisms by which energy intake and exercise affect structural and functional neuroplasticity. This topic will be considered from a bioenergetic perspective with emphases on brain evolution, developmental neurobiology, adult neuroplasticity and disorders of mood and cognition. The course will consist of a series of introductory lectures, and subsequent class meetings in which hot topics in the field are discussed.

ME.440.819. Rigor, Reproducibility, and Responsibility in Science. 2 Credits.
In this course, students will learn the professional norms and practices central to a successful scientific career. Also, students will learn about what constitutes scientific misconduct and about proper behavior involving issues of authorship and various conflicts of interest. Students will be exposed to rules, regulations, and ethics relating to animal and human experimentation. Further, participants will learn about how to choose a lab, keep proper records, deliver presentations, and seek funding.

ME.440.820. Circuits and Brain Disorders. 2 Credits.
The course is designed to serve as an introduction to neurodegenerative disorders of the nervous system, and is intended to provide a balance of basic neurobiology, clinical presentation, biomarkers, genetics, and therapeutic approaches. One of the goals would be to highlight the distinct circuitry that is most impacted by each disorder. The curriculum includes: (1) one lecture per week and (2) a coordinated journal club once per week.

ME.440.821. Readings in Neuroscience Journal Club.

ME.440.822. Computational Principles of Biological Vision. 3 Credits.
This course will present up-to-the-minute synthesis of what are considered the most important insights into how vision, especially object vision, works, at the level of biological information processing. The result will be a coherent, mechanistic account of how the brain transforms images into visual understanding. Also, this course will teach how to critically evaluate current research papers within that framework by incorporating discussions of current papers into the lectures and assignments.

ME.440.823. Grant Writing Skills. 1 Credit.
The course covers topics such as: writing a clear and compelling specifics aims page; writing a concise background section; preliminary data; stating a clear hypothesis; describing how data will be analyzed and how results will be predicted; power analysis and sufficient sample size; problems and alternatives; devising a budget and justification; and using vertebrate and human subjects.

ME.440.824. Cell Physiology of Visual and Olfactory Transductions. 1 Credit.
A reading/student presentation course focusing on visual and olfactory transductions studied by single-cell electrophysiology.

ME.440.825. Quantitative Neurogenomics. 3 Credits.