NBL-Neurobiology

NBL 600. Special Topics in Neurobiology 1. 3 Hours.
This course covers different topics that have to do with Neurobiology.

NBL 601. College of Basic Cognition & Clinical Neuroscience. 3 Hours.
The Colloquium in Basic, Cognitive and Clinical Neuroscience is a faculty seminar. The Colloquium will expose students to cutting edge research programs and technologies from approximately 25 faculty each year who serve as mentors for the Undergraduate Neuroscience Major and Graduate Neuroscience Program. Faculty will also discuss strategies for development of careers in medicine and research. Students will prepare by reading an assigned research article authored by the speaker and be prepared for a group discussion. Class meets for one and a half hours a week.

NBL 610. Synapses, Neurons and Brains. 3 Hours.
Molecular Neuroscience will provide students an advanced understanding of how the brain works with a focus on protein function. Everything the brain does is built upon the actions of proteins, many of which are completely unique to the brain. Together we will work to thoroughly understand the exact molecular mechanisms utilized by the brain to support the complex function of our most fascinating organ. Topics covered will include brain morphogenesis, axonal outgrowth, synapse formation, neurotransmitter biosynthesis, intracellular signaling, and the blood brain barrier. This lecture course is designed to fulfill a neuroscience major's requirement for an advanced course. Non-neuroscience majors should seek course master approval before enrolling and must have a significant background in biology and/or chemistry. Students will be required to purchase a text. Grades will be assigned based on points accumulated through weekly quizzes, cumulative exams, and written reports. It is strongly recommended that students have undergraduate coursework in biology and chemistry prior to taking this class.

NBL 620. No Self Control. 3 Hours.
Survival of self and species has been evolutionarily wired into the brain. Largely, involving sub-cortical networks, animals are strongly rewarded through beneficial outcomes and driven away from aversive situations. Overseeing these opposing subconscious determinants of motivated behavior is a pre-frontal cortical command center, which along with additional systems that provide for experiential memory and emotional significance, guide the choices we make. This course will provide the participant with an introduction to the neuronal pathways that underlie normal decision making, with a major focus on how this circuitry becomes compromised during addiction. These topics should be relevant to students interested in biomedicine, health professions or counseling. NBL 355 or NBL 610 recommended but not required.

NBL 624. This is your brain on drugs: Neuropsychopharmacology. 3 Hours.
People have long exploited the brain's responses to a wide variety of chemicals to alter their experiences in the world. These drugs have had profound effects on individuals and societies, both positive and negative. This course will cover the neurological basis of the response to these drugs, their psychological effects, mechanisms of action that underly them, and the pharmacology of drugs in the brain and body. Students should also be able to identify different drug classes, the relationships between drugs and society, and the history of how we have understood different drugs. NBL 230 is recommended.
Prerequisites: NBL 230 [Min Grade: C]

NBL 625. Methods in Human Neuroimaging. 3 Hours.
The ability to perform neuroimaging studies on awake human individuals has produced a conceptual revolution in the study of human cognition. This course will examine the methods and techniques in human neuroimaging with the primary goal of building basic understanding of how these tools work. The course will explore techniques, such as single cell recordings, deep brain stimulation, electroencephalography, magnetoencephalography, and diffusion weighted imaging, and focuses on functional magnetic resonance imaging. By the end of the course, students will have gained basic knowledge in the field and will be able to read and critically assess scientific journal articles that make use of a variety of neuroimaging methods. The secondary and implicit goal of this course is to create and nurture, in students, a genuine interest in neuroscience and neuroimaging.
Prerequisites: NBL 356 [Min Grade: C] or NBL 655 [Min Grade: C] or NBL 656 [Min Grade: C]

NBL 632. Basic Science of Nervous System Disorders. 3 Hours.
Major advances have been made in understanding diseases of the nervous system at cellular and molecular levels. This course intends to review some of the most common CNS disorders such as Alzheimer's Disease, Parkinson's Disease, ALS and Huntington's Disease. This course will focus solely on identification of cellular pathways involved in these diseases and how alterations in these pathways result in neurodegeneration. This class will build upon fundamental concepts in cell biology, genetics and neuroscience to gain a better understanding of disease pathogenesis in the nervous system.
Prerequisites: NBL 356 [Min Grade: C] or NBL 655 [Min Grade: C] or NBL 656 [Min Grade: C]

NBL 633. Clinical Aspects of Nervous System Disorders. 3 Hours.
Major advances have been made in the treatment of nervous system disorders. Several new findings have had direct therapeutic implications and have resulted in the development of novel drugs or new disease management strategies. This course intends to review some of the most common CNS disorders such as Alzheimer's Disease, Parkinson's Disease, ALS and Huntington's Disease. This course will focuses solely on the clinical aspects of these disorders and will include epidemiology, diagnosis, examination of neural circuits involved and therapeutic treatment. In addition, we will discuss how discoveries find their way from the bench to the bedside and the role that clinical trials play in the process.
Prerequisites: NBL 356 [Min Grade: C] or NBL 655 [Min Grade: C] or NBL 656 [Min Grade: C]

NBL 634. Mechanisms of Memory. 3 Hours.
Molecular, cellular, systems and medical components of neuroscience, with an emphasis on cognition and cognitive disorders. Covers topics ranging from genes and molecules to human behavior, using cognitive function and clinical cognitive disorders as the unifying theme, with a focus on learning and memory and disorders of these processes.

NBL 644. Memento Mori: neurodegeneration from cradle to coffin and bench to bedside.. 3 Hours.
We all die. We live in a wealthy enough country that many of us will survive long enough to die with a neurodegenerative disease. As the population ages, neurodegenerative diseases are becoming more and more common, so it's important to understand them and figure out how to treat them. This course will cover multiple neurodegenerative diseases, from ones that begin in childhood to slow-progressing diseases that occur late in life. We will discuss approaches to treat the diseases, the basics of the therapeutic pipeline, basic disease mechanisms, and common themes across neurodegeneration.
Prerequisites: NBL 230 [Min Grade: C] and (NBL 433 [Min Grade: C] or NBL 633 [Min Grade: C])

NBL 655. Synapses, Neurons and Brains. 3 Hours.
Introduction to the cellular and molecular biology, biochemistry, biophysics, genetics and function of the mammalian nervous system. This course will emphasize the development, anatomy, cellular and molecular biology and biochemistry of neurons and glial cells, and introduce electrical, biophysical and chemical signaling within and across neurons.

NBL 656. From Systems to Cog Neuro. 3 Hours.
Introduction to the cellular and molecular biology, biochemistry, biophysics, genetics and function of the mammalian nervous system. This course will emphasize mechanisms of synaptic transmission, sensory systems, neuropharmacology, and synaptic plasticity; and introduce the molecular basis of diseases and disorders of the central and peripheral nervous systems.

NBL 657. Neurogenetics. 3 Hours.
This is an upper level interdisciplinary course that links key concepts in genetics to neurological disease. It will provide students with an understanding as to how mutations lead to disease and what kinds of research is involved in studying genetic disorders. This course will also include a research and service learning component to incorporate experience-based learning into the classroom.
Prerequisites: BY 123 [Min Grade: C]

NBL 684. Don't Sleep on this class: biological rhythms and sleep. 3 Hours.
Earthly creatures have adapted to light-dark cycles created by the earth's rotation. Complex biological behaviors and even cellular changes have these twenty-four–hour cycles, called circadian rhythms. This course will dive into the basis of these rhythms: exogenous zeitgebers and molecular clocks; and their consequences. Perhaps the most prominent behavioral rhythm is sleep, so we will distinguish between sleep and circadian rhythms, learn what sleep is, why we sleep, and what the consequences of circadian and sleep disruption are. NBL 230 is recommended.
Prerequisites: NBL 230 [Min Grade: C]

NBL 698. Research Practice in Neurobiology. 1-6 Hour.
Project or research activity supervised by faculty.

NBL 700. Introduction to Cellular and Molecular Neurobiology. 3 Hours.
Topics in Neurobiology.

NBL 703. Nuerobiology Seminar Series. 1 Hour.
Current research topics in neurobiologypresented by visiting scholars and campus faculty.

NBL 707. Cognition & Cognitive Disorder. 1 Hour.

NBL 711. Medical Neuroscience. 5 Hours.

NBL 720. Membrane Excitability Biophysics. 3 Hours.
The course will consist of 7 topics covered over 8 weeks (including course orientation): Properties of lipid bilayers, Ions in solution, Ion channel permeability and selectivity, Ligand-dependent channel gating, G-protein-coupled receptor kinetics, Transporters and Pumps, and Voltage-dependent channel gating. For each topic a faculty member will present an overview lecture and students will present a single mini-lecture on a more focused concept within the topic. The mini-lecture will be based on published literature and should be discussed before presentation with the topic leader. It should be a formal PowerPoint lecture lasting a maximum of 20 min.

NBL 723. Experimental Design. 1 Hour.
In depth and specialized training for our Roadmap Scholars in hypothesis development, experimental design and scientific writing. During this course, Roadmap Scholars will develop an NRSA, or similar, grant proposal.

NBL 725. Seminar Practice in Cellular and Molecular Neuroscience. 1 Hour.
The course will provide guidance and practice in the presentation of research seminars. It will also provide a forum for students to become actively involved in listening to seminar presentations and partcipating in speaker questioning. Once during the course each student will present a 50 minute seminar describing his/her current research, during which the other students and participating faculty will ask questions and provide comments and suggestions. Following the presentation the student will receive a constructive critique from the faculty.

NBL 729. Mechanisms of Signal Transduction. 1-3 Hour.

NBL 730. Neurobiology of Disease. 3 Hours.
Major advances have been made in understanding diseases of the nervous system at a cellular and molecular level. Several new findings have had therapeutic implications and have resulted in the development of novel drugs or new disease management strategies. This course intends to review the most common brain and CNS disorders. It will offer a brief clinical introductionto the disease, but will emphasize reviewing current knowledge of the disease at a cellular and molecular level. The course will be taught by several UAB professors who have active research programs directed at studying nervous sys. diseases. The course is designed for advanced graduate and medical students who have a good neurobiology background with NEUR702/NBL750/NBL7.

NBL 735. Statistics for Biomedical Science. 3 Hours.

NBL 740. Mechanisms of Memory. 4 Hours.
This course integrates the molecular, cellular, systems, and medical components of the core curriculum with an emphasis on cognition and cognitive disorders. Thus, the course covers topics ranging from genes and molecules to human behavior, using cognitive function and clinical cognitive disorders as the unifying theme, with a focus on learning and memory and disorders of these processes.

NBL 741. Writing and Presenting. 1 Hour.
Roadmap Scholars will be expected to attend and present posters or talks describing their research at international meetings, such as the Society for Neuroscience annual meeting. We will develop a course to assist the students in writing their abstracts, as well as designing their presentation for the meeting. This course will assist the Neuroscience Roadmap Scholars in developing their presentation skills as neuroscientists.

NBL 743. Methods in Neuroimaging. 3 Hours.
Cognitive neuroscience research has provided valuable insights into the workings of the human brain. The techniques used in cognitive neuroscience span from postmortem brain studies to neuroimaging studies. The ability to perform neuroimaging studies on awake human individuals engaged in cognitive, social, sensory, and motor tasks has produced a conceptual revolution in the study of human cognition. This course will comprehensively examine the methods and techniques in neuroimaging with the primary goal of building fundamental knowledge in the concepts and techniques of neuroimaging. By the end of the course, students will have gained basic knowledge in the field and will be able to read and critically assess scientific journal articles that make use of a variety of neuroimaging methods. The secondary and implicit goal of this course is to create and nurture, in students, a genuine interest in neuroscience and neuroimaging. The course will explore techniques, such as single and multi cell recordings, deep brain stimulation, electroencephalography, functional magnetic resonance imaging, and diffusion tensor imaging. This course will be an apt venue for graduate students interested in neuroscience research to build a platform for continuing studies.

NBL 745. Professional Development Course. 1 Hour.
Today's researchers, scientists, and academics face an increasingly competitive world. We will create a professional development course for our UAB Neuroscience Roadmap Scholars to provide support for their aspiration to become independent and successful neuroscientists.

NBL 752. Developmental Neuroscience. 3 Hours.
The course will utilize the scientific literature and faculty lectures to cover a broad range of topics related to the mechanisms of building a brain. The topics covered range from neural induction in early development, to axonal guidance and synapse formation, to neuro-gial interactions in the adult nervous system. Grades will be based on two exams and student participation in class discussions.

NBL 755. Mind/Brain. 3 Hours.

NBL 758. Synaptic Dynamics. 3 Hours.
A student-driven discussion of the molecular and physiological properties of synapses, this course explores the molecular physiology underlying the control of neurotransmitter release and the postsynaptic response. Quantal theories of synaptic transmission will be discussed with respect to anatomical and physiological differences between central synapses and the neuromuscular junction. Synaptic plasticity mechanisms will also be discussed.

NBL 770. Glial Biology in Medicine. 3 Hours.
This course will cover the role of astrocytes, oligo-dentrocytes and microglia in both the normal development and function of the nervous system, and also their role in injury and disease. Presentations will be student led, with the assistance of the faculty.
Prerequisites: NBL 700 [Min Grade: C] or CMB 754 [Min Grade: C] or NBL 712 [Min Grade: C]

NBL 771. Innovative Techniques, Methods and Models in Neuroscience. 1 Hour.
This is a Journal Club style course that will consist of topics related to innovative methods in neuroscience. Students will read and discuss papers on groundbreaking techniques, such as CRISPR/Cas9 systems, optogenetics, CLARITY, flow cytometry and DREADDs. Each week one student will be responsible for presenting the seminal paper discussing the novel technique, providing advantages, disadvantages and limitations of the technique. The class as a whole will then discuss a paper in which the novel technique was applied. The goal of this course is to equip the next generation of neuroscientists to understand the next generation of neuroscience techniques. Class Assignments and Preparation: All students are required to read the assigned manuscript and be prepared to discuss the method and data presented in the manuscript, as well as potential limitations/pitfalls of the approach considered.

NBL 772. Special Topics i n Neurobiology II. 1-3 Hour.
This course will draw on the cutting edge knowledge, expertise and information provided by the spring Neurobiology Seminar program. There will be two one-hour meetings per week. Prior to each seminar, students will discuss a review article pertinent to the seminar topic, and a recent research paper from the speaker's lab. Following the seminar, new findings presented will be discussed. Students will also have the opportunity (optional) of meeting the speaker at lunch prior to the seminar or at a post-presentation reception.

NBL 773. Molecular Brain Aging JC. 1 Hour.
Across the body, age-related protein expression changes underlie the aging process. This journal club focuses on understanding normal brain aging at the cell and molecular level. We will discuss papers that show how both central and peripheral protein expression differences effect cellular function of brain to promote age-related change.

NBL 775. Special Topics in Neurobiology III. 1 Hour.
The aging process is amazing. One person could choose to not exercise, eat fatty foods with abandon, and engage in other risky behaviors but still live to 100 relatively disease free. Meanwhile another develops dementia in their 70s after living a life doing all the "right" things for their body. Often in our desire to prevent and treat disease, we do not spend time studying normal aging process, and thus we don't understand the system we are working within. To effectively target disease requires a thorough understanding not only of disease mechanism but also of how the brain changes during aging. Even when the cognitive aging process does not directly result in development of disease, the changes that occur effect quality of life and could be targeted for intervention. This journal club will focus on exploring papers investigating how the aging process impacts the brain.

NBL 779. Journal Club Topics. 1 Hour.
Journal Club Topics.

NBL 780. Selected Topics in Neurobiology I. 3 Hours.
This course covers different topics that have to do with Neurobiology.

NBL 781. Selected Topics in Neurobiology II. 1 Hour.
This course covers different topics that have to do with Neurobiology.

NBL 782. Neuroimaging Journal Club. 1-2 Hour.
The Neuroimaging Journal Club was created to encourage the discussion of papers and research related to brain imaging. Modalities discussed including but not limited to magnetic resonance imging (MRI), functional magnetic resonance imaging (fMRI), diffusion tensor imaging (DTI), magnetic resonance spectroscopy (MRS), and electroencephalography (EEG).

NBL 784. Synaptic Transmission and Ion Channel Journal Club. 1 Hour.
The Synaptic Transmission & Ion Channels Journal Club provides a forum for discussion and analysis of papers related to electrophysiology of neurons and astrocytes at the level of synapses and circuits. It is focused primarily on electrophysiological methods.

NBL 785. Neurobiology Journal Club-Synaptic Plasticity. 1 Hour.

NBL 786. Cell Death Mech Journal Club. 1 Hour.
Discussion and critical evaluation of seminal or current papers on a broad topic of cell death methanisms in health and diseases, with special emphasis on autophagic mechanisms impact on cell death.

NBL 788. Biology of Glial Cells Journal Club. 1 Hour.
This journal club covers contemporary primary articles on the biology of glial support cells, their role in normal brain function and Neurological disease.

NBL 789. Neurobiology Journal Club. 1 Hour.

NBL 791. Developing Critical Thinking and Analytical Skills. 1 Hour.
One of the key skills that every graduate student needs is the ability to think critically and to analyze data. Many graduate students have not been instructed in how to read the scientific literature, so NBL791 will include sessions for the Neuroscience Roadmap Scholars on how to read and critique a scientific paper. We will select examples of well-constructed journal articles and help the students to learn how to understand, interpret, and evaluate the findings.

NBL 792. Neuro Lab Bench. 3 Hours.
This course is about preparing students in work pertaining to the preparation of PhD candidates in the neurosciences for collecting data from the nervous system: 3 credits. No prerequisites required. It is expected that the student has access to and familiarity with computers. Books: Lab Math, A handbook of Measurements, Calculations, and other Quantification Skills for Use at the Bench by Dany Spencer Adams.

NBL 798. Non-Dissertation Research in Neurobiology. 1-12 Hour.
Research hours in the lab.

NBL 799. Dissertation Research in Neurobiology. 1-12 Hour.
Research hours in the lab.
Prerequisites: GAC Z