Neuroscience

Neuroscience is an ideal major for motivated students who want to pursue careers in medicine, research, and other health related disciplines. The curriculum for a BS degree in Neuroscience combines coursework in biology, chemistry, math, physics, psychology, and neurobiology to provide students an interdisciplinary understanding of the body's most complex organ system.

The UAB Undergraduate Neuroscience Program (UNP) is an interdisciplinary major between the Department of Neurobiology in the Heersink School of Medicine and the Department of Psychology in the College of Arts and Sciences. Neuroscience is the study of the development, structure, and function of the nervous system, with a special focus on the brain and its role in behavior and cognitive functions. Neuroscience also seeks to understand the molecular basis of nervous system disorders and diseases. Multidisciplinary in nature, the field of Neuroscience spans the anatomy, evolution, development, genetics, biochemistry, cell biology, physiology, electrophysiology, pharmacology, circuitry, and pathology of the nervous system. Therefore, neuroscience integrates biology, chemistry, physics, mathematics, psychology, and computer science. It is one of the most rapidly advancing fields in biomedical research.

The goals of the UNP are to prepare and advance UAB undergraduates to careers in research and health-related sciences in highly competitive programs and to enable UAB graduates to become accomplished research scientists, clinicians and health-care professionals who will be ideally equipped for future study of the nervous system and treatment and discovery of cures for neurological, psychiatric and neurodevelopmental disorders and injury.

The UNP and its Training Faculty accomplish these goals by four complementary mechanisms. First, students are provided with a solid academic and intellectual foundation through coursework in biology, chemistry, mathematics, physics, psychology and neuroscience. Second, students conduct original hands-on laboratory research under the direction of faculty mentors to learn the state-of-the-art experimental approaches and methods in Neuroscience research. Third, students are mentored in the development of skills in scientific method, experimental analysis, and effective oral and written communication. Students are expected to become active “colleagues” in faculty laboratories, which should result in publications in scientific journals and presentations at professional meetings. Fourth, students are provided with one-on-one academic and career counseling to identify professional programs most suited to their interests, and strategies to be competitive applicants to these programs.

Students earning the B.S. in Neuroscience at UAB are ideally suited for admission into the nation’s most prestigious graduate programs, medical and professional schools.

Admissions

The UNP is designed for graduating high school seniors and college freshmen or sophomores with a strong academic record and the motivation to pursue a career in biomedical science. Please note carefully the following items.

High school students with an ACT score of 28 or higher and a GPA of 3.5 or higher (the UAB Honors College admissions criteria) are eligible for immediate acceptance into the Neuroscience major. Others may choose to attend UAB before applying in the freshman or sophomore year. Current UAB students whose high school credentials meet the minimum requirements and/or whose academic performance in freshman science courses is excellent may apply at any time. Please contact Dr. Cristin Gavin (cfgavin@uab.edu) or Dr. Robert Sorge (rsorge@uab.edu), if you would like to be considered for admission to the Program. Program Leadership is available to meet with high school students and their parents, or with current UAB students, to discuss the Program.

Advising and Information

Program Leadership:

Dr. Cristin Gavin
Co-Director, Undergraduate Neuroscience Program
Assistant Professor of Neurobiology, School of Medicine
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Academic Advising:

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Major Requirements for Neuroscience

Requirements		Hours
Blazer Core Requirements		**41**
Biology		
BY 123	Introductory Biology I	4
BY 124	Introductory Biology II	4
Chemistry		
CH 115 & CH 116	General Chemistry I and General Chemistry I Laboratory	4
CH 117 & CH 118	General Chemistry II and General Chemistry II Laboratory	4
CH 235 & CH 236	Organic Chemistry I and Organic Chemistry I Laboratory	4
CH 237 & CH 238	Organic Chemistry II and Organic Chemistry II Laboratory	4
CH 460	Fundamentals of Biochemistry	3
Psychology and Neurobiology		
NBL 230	Brain Science: Biology, Disorders, and Clinical Therapies (Part I of III)	3
or PY 253	Brain, Mind and Behavior	
PY 101/201	Introduction to Psychology	3
NBL 355	Synapses, Neurons and Brains (Part II of III)	3
NBL 356	Mechanisms of Sensation, Movement & Cognition (Part III of III)	3
Neuroscience Colloquium		
401 should be taken spring of freshman or sophomore year year, and 402 should be taken spring of junior year.		2
NBL 401	Colloquium in Basic, Cognitive and Clinical Neuroscience	

NBL 402	Colloquium in Basic, Cognitive and Clinical Neuroscience	
Advanced Neuroscience Courses		
Select any three courses from the following		9
NBL 410	Molecular Biology of the Neuron	
NBL 420	No Self Control: Motivation, Reward and Addiction	
NBL 423	Functional MRI (The title of this course should be updated to "Functional MRI")	
NBL 425	Methods in Human Neuroimaging	
NBL 427	Anatomical Journey thru the Brain	
NBL 430	How to Build a Brain	
PY 431	The Dynamics of Pain	
NBL 433	Diseases of the Nervous System	
NBL 434	Mechanisms of Memory	
NBL 444	Memento Mori	
PY 435	Motivation and Emotion	
PY 453	Advanced Behavioral Neuroscience	
PY 463	Cognitive Neuroscience	
or PY 464	Honors Cognitive Neuroscience	
PY 468	Cognitive Neuroimaging	
PY 472	Social Psychophysiology	
VIS 456	Visual Neuroscience	
Physics		
Select one group PH 201 & 202 or PH 221 & 222		8
PH 201 & 201L	College Physics I and College Physics Laboratory I	
PH 202	College Physics II	
PH 221 & 221L	General Physics I and General Physics Laboratory I	
PH 222 & 222L	General Physics II and General Physics Laboratory II	
General		
MA 125	Calculus I	4
or MA 168	Mathematics of Biological Systems I	
PHL 116	Bioethics	3
Statistics		
Select one of the following: [1]		3-4
PUH 250	Biostatistics	
PY 216 & 216L	Elementary Statistical Methods and Elementary Statistical Methods Laboratory	
MA 180	Introduction to Statistics	
Research		
Students may choose to complete a laboratory- or literature-based research thesis.		6 total
For the research-based thesis students complete:		
NBL 398	Research Practicum in Neurobiology [2]	
or PY 398	Research Practicum in Psychology	
For the literature-based thesis students complete:		
NBL 390	Neurobiology Research Laboratory [3]	
or NBL 240	Introduction to Neuroscience Methods	
NBL 399	Senior Seminar in Neuroscience	
General Electives		**5-10**
Total Hours		**120**

1 Medical school requires 6 hours of college math. AP Calculus can be substituted for 3 credit hours, but pre-medical students must take another math course at UAB. MA 180 or PUH 250 both satisfy the requirement; therefore, students planning to attend medical school should take one of those two courses as opposed to other options.

2 Research credit hours (NBL/PY 398) are distributed across multiple semesters. Students should register for NBL 398 if their research mentor resides in the Heersink School of Medicine, School of Dentistry, or School of Optometry, and PY 398 if their mentor resides in the College of Arts and Sciences. PSDO 200 is a prerequisite to register for NBL 398. NBL 398 and PY 398 credit can be applied toward completion of the Science and Technology Honors Program.

3 3 credit hours of PY 398 can also be applied toward a literature-based thesis.

Neuroscience majors in the laboratory-based research track should be working under the direction of a faculty mentor no later than the first semester of their junior year. However, students may identify a mentor and begin conducting research following completion of PSDO 200 in their freshman year.

Recommended but not Required:

PSDO 200 Introduction to Research (1 credit hour) - prerequisite to conduct research in the Heersink School of Medicine

NBL 240 Introduction to Neuroscience Methods (3 credit hours)

NBL 327 100 Things You've Always Wanted to Know About the Brain (3 credit hours)

NBL 245 The Neurobiology of Learning and Memory (3 credit hours)

BY 330 Cell Biology (3 credit hours)

BY 210 Genetics (3 credit hours)

PY 236 Introduction to Research with Animal Models (3 credit hours)

PY 340 Behavioral MCAT Preparation (3 credit hours)

PY 372 Social Psychology (3 credit hours)

PY 380 The Sensory and Perceptual Brain (3 credit hours)

PY 390 Animal Behavior (3 credit hours)

PY 470 Introduction to Neurobiology (3 credit hours)

It is recommended that premedical students should take SOC 100.

Academic Performance Requirement: Neuroscience majors must maintain an overall GPA of 3.0 to remain in the program. Any students falling below the academic requirement will be given 2 semesters to raise their GPA and a subsequent semester of academic probation with the program.

Laboratory-Based Research Options

Freshman			
First Term	**Hours**	**Second Term**	**Hours**
MA 125	4	BY 123	4
CH 115 & CH 116	4	CH 117 & CH 118	4
PY 101 or 201	3	PHL 116	3
EH 101[1]	3	EH 102	3
		NBL 210[3]	3
	14		**17**

Sophomore

First Term	Hours	Second Term	Hours
CH 235 & CH 236	4	CH 237 & CH 238	4
BY 124[2]	4	NBL 355	3
PY 253 or NBL 230	3	NBL 401	1
Core Area II Fine Arts	3	Core Area II Literature	3
		NBL 398 or PY 398[4]	0-7
	14		**11-18**

Junior

First Term	Hours	Second Term	Hours
CH 460	3	PH 202 or 222	4
NBL 356	3	NBL Upper level course	3
PH 201 or 221	4	NBL 401	1
Core Area IV History	3	Final History/Lit Series	3
	13		**11**

Senior

First Term	Hours	Second Term	Hours
NBL Upper level course	3	Area IV Soc/Behav Science	3
Area II/Area IV Elective	3		
	6		**3**

Total credit hours: 89-96

1 Often use AP credit for EH 101, Can take EH 102 instead
2 Sometimes taken summer after freshman year
3 or Stats equivalent
4 Begin lab research

Literature-Based Research Option

Freshman

First Term	Hours	Second Term	Hours
MA 125	4	BY 123	4
CH 115 & CH 116	4	CH 117 & CH 118	4
PY 101 or 201	3	PHL 116	3
EH 101[1]	3	EH 102	3
		NBL 210[3]	3
	14		**17**

Sophomore

First Term	Hours	Second Term	Hours
CH 235 & CH 236	4	CH 237 & CH 238	4
BY 124[2]	4	NBL 355	3
PY 253 or NBL 230	3	NBL 401	1
Core Area II Fine Arts	3		
	14		**8**

Junior

First Term	Hours	Second Term	Hours
CH 460	3	PH 202 or 222	4
NBL 356	3	NBL 390	3
PH 201 or 221	4	NBL 401	1
Core Area IV History	3	NBL Upper level course	3
	13		**11**

Senior

First Term	Hours	Second Term	Hours
NBL Upper level course	3	Area IV Soc/Behav Science	3
Area II Humanities	3	Final History/Lit Series	3
	6		**6**

Total credit hours: 89

1 Often use AP credit for EH 101, Can take EH 102 instead
2 Sometimes taken summer after freshman year
3 or Stats equivalent

Minor Requirements for Neuroscience

Requirements		Hours
PY 253	Brain, Mind and Behavior	3
or NBL 230	Brain Science: Biology, Disorders, and Clinical Therapies	
NBL 355	Synapses, Neurons and Brains	3
NBL 356	Mechanisms of Sensation, Movement & Cognition	3
or PY 353	Behavioral Neuroscience	
Required: 3 electives at the 200 level or above with one elective at the 400 level or above		**9**
NBL 210	Scientific Reasoning and Medical Research Design	
NBL 225	No Self Control: Motivation, Reward and Addiction	
NBL 240	Introduction to Neuroscience Methods	
NBL 245	The Neurobiology of Learning and Memory	
NBL 324	Anatomical Journey thru the Brain	
NBL 327	100 Things You've Always Wanted to Know About the Brain	
NBL 410	Molecular Biology of the Neuron	
NBL 420	No Self Control: Motivation, Reward and Addiction	
NBL 425	Methods in Human Neuroimaging	
NBL 427	Anatomical Journey thru the Brain	
NBL 430	How to Build a Brain	
NBL 433	Diseases of the Nervous System	
NBL 434	Mechanisms of Memory	
NBL 440	Memento Mori: neurodegeneration from cradle to coffin and bench to bedside	
PY 201	Honors Introduction to Psychology	
PY 340	Behavioral MCAT Preparation	
PY 354	Autism: Brain and Cognition	
PY 363	Cognitive Psychology	
PY 380	The Sensory and Perceptual Brain	
PY 390	Animal Behavior	
PY 405	Biofeedback, Meditation, and Self-Regulation	
PY 420	Special Topics in Psychology	
PY 431	The Dynamics of Pain	
PY 435	Motivation and Emotion	
PY 453	Advanced Behavioral Neuroscience	
PY 455	Psychology of Eating Disorders and Obesity	
PY 463	Cognitive Neuroscience	
PY 468	Cognitive Neuroimaging	
VIS 429	Intro to Neurobiology	
VIS 456	Visual Neuroscience	
Total Hours		**18**

Courses

NBL 120. Basic Neuroscience. 3 Hours.

NBL 121. Basic Neuroscience. 3 Hours.

NBL 150. The Brain: A User's Guide. 4 Hours.
Neuroscience is one of the fastest growing disciplines in all of science. Using tools and perspectives adopted from across many scientific realms, neuroscience researchers have now learned more about the brain in the last two decades than in all of human history combined. Like never before, neuroscience is providing us with information pertinent to our everyday lives and in the process become a part of contemporary culture. In this lecture and integrated lab course, we will explore a range of neuroscience-related topics, including but not limited to creativity, consciousness, perception, love and emotion, brain health, motivation, stress, personality, and the differences between the male and female brain. There will be no required text for the course, and participants need no scientific background to participate.

NBL 210. Scientific Reasoning and Medical Research Design. 3 Hours.
The goal of this course is to teach biomedical research design basics and critical thinking skills in the context of neuroscience research. This knowledge should be helpful for understanding and conducting scientific research, as well as for the updated sections of the 2015 MCAT test for medical school admission.

NBL 220. Special Topics Neuroscience 1. 1 Hour.
This course covers different topics that have to do with Neurobiology.

NBL 222. Special Topics Neuroscience 2. 2 Hours.
This course covers different topics that have to do with Neurobiology.

NBL 225. No Self Control: Motivation, Reward and Addiction. 3 Hours.
Survival of self and species has been evolutionarily wired into the brain. Largely, involving sub-cortical networks, animals are strongly rewarded by 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 230. Brain Science: Biology, Disorders, and Clinical Therapies. 3 Hours.
This course is an introduction to the mammalian nervous system, intended to give a strong foundation or understanding of the human brain. Topics include the composition and function of neurons and glia, sensory systems and perception, movement, basic learning and memory, and select diseases of the brain. Students also explore the principles of experimental design and apply those to contemporary neuroscience techniques. PY 101 (or equivalent) and BY 123 strongly recommended.

NBL 240. Introduction to Neuroscience Methods. 3 Hours.
This course is designed to develop practical, experience-based laboratory skills in undergraduate student researchers with minimal prior laboratory exposure. Students will be exposed to a variety of techniques ranging from cellular and molecular to vertebrate animal applications. Any student that completes this course should have the rudimentary skills (and confidence!) to begin supervised research in primary laboratories around campus. No background in Neuroscience required.

NBL 245. The Neurobiology of Learning and Memory. 3 Hours.
This course focuses on the biological mechanisms involved in the processes of learning and memory in the nervous system. We will examine these mechanisms at the molecular, cellular and systems levels of the brain. Topics range from memory-associated molecules and synaptic plasticity to animal models and human behavior. In addition, students will be introduced to the many behavioral paradigms and molecular genetic techniques used by neuroscientists to study learning and memory in the brain.

NBL 298. Special Topics Neuroscience 4. 1 Hour.
This course covers different topics that have to do with Neurobiology.

NBL 310. Evolution of the Vertebrate Brain. 3 Hours.

NBL 311. From Wet Brains to Artificial Stupidity. 1-3 Hour.

NBL 323. Special Topics Neurobiology 1. 1 Hour.
This course covers differnet topics that have to do with Neurobiology.

NBL 324. Anatomical Journey thru the Brain. 3 Hours.
Have you every wanted to know where the amygdala sits in the brain, or how the brainstem connects to the thalamus and basal ganglia? Would you like to know about processing in the spinal cord, and how this information is sent to and from the cortex? This course will show you how to find any structure in the nervous system, and how these regions interact to control body movements, give rise to sensory perception, generate emotions and experiences, make decisions, and create personality. Each week will use interactive didactic sessions, anatomical drawing exercises, real brain lab experiences, radiographic imaging, and small group medical case discussions, to break down the brain into manageable components, to see how its outer coverings, blood supply, gray and white matter are structurally and functionally organized to make you who you are. This course may be beneficial for students considering careers in the medical, dental or optometry fields, along with those wanting to pursue graduate research in neuroscience. Students without a general neuroscience background may consider taking NBL 230 or PY 253 (recommended but not required).

NBL 325. Special Topics Neurobiology 3. 2 Hours.
This course covers different topics that have to do with Neurobiology.

NBL 327. 100 Things You've Always Wanted to Know About the Brain. 3 Hours.
This course examines intriguing questions in neuroscience as they are presented to the layperson through TED Talks, video presentations, podcasts, Scientific American articles, and newspaper/magazine science op-eds. The aim is to expose students to a wide range of topics about the brain, some fundamental, some controversial, in ways they may not have thought about before; challenging them to discuss the evidence for and against various theories of brain function. There will be no memorization of information, only the willingness to read, post and discuss scientific opinions on articles/videos. Non majors are encouraged!.

NBL 355. 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.
Prerequisites: BY 123 [Min Grade: C] and (CH 117 [Min Grade: C] or CH 127 [Min Grade: C]) and (NBL 230 [Min Grade: C] or PY 253 [Min Grade: C])

NBL 356. Mechanisms of Sensation, Movement & Cognition. 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.
Prerequisites: PY 355 [Min Grade: C] or NBL 355 [Min Grade: C]

NBL 390. Neurobiology Research Laboratory. 3 Hours.
Hands-on instruction will be provided in contemporary methods used in neurobiology research. These will include molecular cloning, DNA sequencing, cell transformation and culture, western blotting, immunohistochemistry and electrophysiology.

NBL 396. Teaching Practicum in Neurobiology. 1 Hour.
Teaching experience in neurobiology courses, supervised by a faculty member. Student must have previously taken the course for which the student will work within.

NBL 397. Community-Based Practicum in Neurobiology. 1-6 Hour.
Community work in various supervised settings related to practical applications of neuroscience (for example, non-profits, educational settings, and other outreach) are significant components of this course.

NBL 398. Research Practicum in Neurobiology. 0-6 Hours.
Project or research activity supervised by faculty. Cannot be taken Pass/Fail.
Prerequisites: PSDO 200 [Min Grade: C]

NBL 399. Senior Seminar in Neuroscience. 3 Hours.
All (Thesis Track) Neuroscience majors will participate in the Senior Seminar, which is a capstone experience in their study of Neuroscience. The seminar will meet weekly for in-depth discussions of current topics in neuroscience. Over the course of the semester, students will independently develop and complete a capstone research paper on a topic of their choosing while working closely with a supervising faculty member. The research report serves as a culminating academic and intellectual experience that works to develop critical thinking, research skills, and both written and oral communication. Students will present their papers at the completion of the course. (Fall and Spring availability).

NBL 400. Special Topics in Neurobiology 1. 3 Hours.
This course covers different topics that have to do with Neurobiology.

NBL 401. Colloquium in Basic, Cognitive and Clinical Neuroscience. 1 Hour.
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 402. Colloquium in Basic, Cognitive and Clinical Neuroscience. 1 Hour.
This class serves as an introduction to professional expectations and practices related to careers in the biomedical field. Students will identify and discuss pre-professional competencies, create discipline-specific writing for applications to graduate and professional school, and develop competency in oral communication on topics such as research and leadership. This class is open to Neuroscience majors in their junior or senior year.
Prerequisites: NBL 401 [Min Grade: C]

NBL 403. Special Topics in Neurobiology 2. 3 Hours.
This course covers different topics that have to do with Neurobiology.

NBL 410. Molecular Biology of the Neuron. 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.
Prerequisites: (NBL 230 [Min Grade: C] or PY 253 [Min Grade: C]) and (NBL 355 [Min Grade: C] or PY 355 [Min Grade: C]) and (NBL 356 [Min Grade: C] or PY 356 [Min Grade: C])

NBL 420. No Self Control: Motivation, Reward and Addiction. 3 Hours.
Survival of self and species has been evolutionarily wired into the brain. Largely, involving sub-cortical networks, animals are strongly rewarded by 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. In addition to listed prerequisites, NBL 356 is strongly recommended.
Prerequisites: (NBL 230 [Min Grade: C] or PY 253 [Min Grade: C]) and (NBL 355 [Min Grade: C] or PY 353 [Min Grade: C])

NBL 423. Functional MRI. 3 Hours.
This course covers different topics that have to do with Neurobiology.

NBL 425. 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.

NBL 427. Anatomical Journey thru the Brain. 3 Hours.
Have you every wanted to know where the amygdala sits in the brain, or how the brainstem connects to the thalamus and basal ganglia? Would you like to know about processing in the spinal cord, and how this information is sent to and from the cortex? This course will show you how to find any structure in the nervous system, and how these regions interact to control body movements, give rise to sensory perception, generate emotions and experiences, make decisions, and create personality. Each week will use interactive didactic sessions, anatomical drawing exercises, real brain lab experiences, radiographic imaging, and small group medical case discussions, to break down the brain into manageable components, to see how its outer coverings, blood supply, gray and white matter are structurally and functionally organized to make you who you are. This course may be beneficial for students considering careers in the medical, dental or optometry fields, along with those wanting to pursue graduate research in neuroscience. Students without a general neuroscience background may consider taking NBL 230 or PY 253 (recommended but not required).

NBL 430. How to Build a Brain. 3 Hours.
It starts with a dividing glob of cells. Not a single cell is any different, but with the right application of magic and a few short days, not only is your stomach a stomach, and your brain a brain, but all of the different kinds of cells of your brain needs to function are in the perfect spot and at the perfect number. Every neuron finds its exact target even when that means having to read a complex set of signals that change every few micrometers. Add to this exquisite complexity, all the things that can go wrong from genetics to environmental exposures and it is truly amazing that neurodevelopment happens successfully as often as it does. This course will explore the “magic” that is the development of the nervous system. Students will understand the complex cellular and molecular mechanisms at play to form a functional brain and explore where problems can occur to cause the most common neurodevelopmental disorders.

NBL 432. Diseases of the Nervous System I. 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: PY 356 [Min Grade: C] or NBL 356 [Min Grade: C]

NBL 433. Diseases of the Nervous System. 3 Hours.
Molecular mechanisms and treatments for neurological, psychiatric, and injury based disorders and diseases of the nervous system. Topics include neurodevelopmental disorders (including intellectual disability and autism spectrum disorders), neurological disorders (including neurodegenerative and demyelinating disease), neuropsychiatric disorders (including depression disorders and schizophrenia), and injury to the nervous system (including stroke and traumatic brain and spinal cord injury).
Prerequisites: PY 356 [Min Grade: C] or NBL 356 [Min Grade: C]

NBL 434. 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.
Prerequisites: (NBL 355 [Min Grade: C] or PY 355 [Min Grade: C]) and (NBL 356 [Min Grade: C] or PY 356 [Min Grade: C])

NBL 440. 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 or PY 253 are required,and NBL 433 is recommended but not required.
Prerequisites: NBL 230 [Min Grade: C] or PY 253 [Min Grade: C]

NBL 442. Sp Tp Neuroscience 2. 2 Hours.
This course covers different topics that have to do with Neurobiology.

NBL 444. Memento Mori. 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. NBL 230 and NBL 433 are recommended.

NBL 446. Special Topics Neuroscience 4. 4 Hours.
This course covers different topics that have to do with Neuroscience.

NBL 454. Mind/Brain Course. 3 Hours.

NBL 455. 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 484. 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 499. Neurobiology Thesis. 0 Hours.
Students should register for this class the semester they plan to submit their undergraduate thesis. If completing a literature based thesis in NBL 399, register for this class concurrently.