NEUROSCIENCE, DEVELOPMENTAL AND REGENERATIVE BIOLOGY (NDRB)

NOTE: All prerequisites for Neuroscience, Developmental and Regenerative Biology (NDRB) courses must be completed with a grade of "C-" or better.

Neuroscience, Developmental and Regenerative Biology (NDRB) Courses

NDRB 1033. Drugs and Society. (3-0) 3 Credit Hours.
An examination of licit and illicit drugs and their biosocial effects. Topics include pharmacology of alcohol, stimulants, hallucinogens, addiction, and abuse. May be applied toward the Core Curriculum requirement in Social and Behavioral Sciences. (Same as BIO 1033. Credit cannot be earned for both NDRB 1033 and BIO 1033.) Generally offered: Fall, Spring. Course Fees: LRC1 $12; LRS1 $46.20; STSI $21.60.

NDRB 2113. Introduction to Neuroscience. (3-0) 3 Credit Hours.
Prerequisite: BIO 1203 (formerly BIO 1404). An introduction to the interdisciplinary field of Neuroscience, including understanding of the foundations of brain function, behavior, and neurological diseases from molecular, neuroanatomical, neurophysiological, neurochemical, and behavioral points of view. Generally offered: Fall, Spring. Course Fees: LRS1 $46.20, STSI $21.60.

NDRB 2953. Special Topics. (3-0) 3 Credit Hours.
An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Topics may be repeated for credit when the topics vary, but no more than 6 semester credit hours will apply to a bachelor's degree, regardless of discipline. No more than 6 semester credit hours of NDRB 2953, NDRB 4951, or NDRB 4953 can be applied to a Bachelor of Science degree in Neuroscience. Course Fees: LRS1 $46.20; STSI $21.60.

NDRB 3213. Animal Behavior. (3-0) 3 Credit Hours.
Prerequisites: BIO 1203 (formerly BIO 1404); prior completion of BIO 1223 (formerly BIO 1414) recommended. This course will introduce various approaches to the study of animals and their behavior in natural habitats. The course will examine basic principles derived from studying the evolution, ecology, and development of animals, and use these principles to explain how and why animals behave as they do in particular situations. (Formerly BIO 3213. Credit cannot be earned for both NDRB 3213 and BIO 3213.) Generally offered: Fall, Spring, Summer. Differential Tuition $150. Course fee: IUB1 $10.

NDRB 3362. Molecular Biochemistry Laboratory. (1-4) 2 Credit Hours.
Prerequisites: BIO 2362, CHE 1103, and completion or concurrent enrollment in MAT 1093 or higher. A study of the microscopic, biochemical and molecular techniques used to investigate biochemical reactions and the structure and function of proteins in cells and tissues. Techniques will include protein extraction, protein characterization, enzyme kinetics, chromatography, western blotting, Immunofluorescence, and bioinformatics. (Formerly BIO 3522, BIO 3822, and BME 3114. Same as BIO 3362. Credit cannot be earned for both NDRB 3362 and BIO 3362 or NRDB 3362 and any of the following: BIO 3522, BIO 3822, or BME 3114.) Generally offered: Fall, Spring, Summer. Differential tuition: $100, Course Fees: IUB1 $10; L001 $30.

NDRB 3433. Neurobiology. (3-0) 3 Credit Hours.
Prerequisite: NDRB 2113. Anatomy and physiology of nervous systems and the mechanisms of neuronal functions. Formerly BIO 3433. Credit cannot be earned for both NDRB 3433 and BIO 3433. Generally offered: Fall, Spring. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 3442. Neurobiology Laboratory. (0-4) 2 Credit Hours.
Prerequisites: NDRB 2113 and completion of or concurrent enrollment in NDRB 3433. A laboratory course emphasizing principles presented in NDRB 3433. (Formerly BIO 3442. Credit cannot be earned for both NDRB 3442 and BIO 3442.) Generally offered: Fall, Spring. Differential Tuition: $100. Course Fees: IUB1 $10; L001 $30.

NDRB 3453. Neuroscience and Our Future. (3-0) 3 Credit Hours.
Prerequisite: NDRB 2113. A discussion of the implications of recent Neuroscience discoveries. Students will use available literature and their own powers of reason to separate fact from fantasy and determine what future applications of Neuroscience may be possible. (Formerly BIO 3453. Credit cannot be earned for both NDRB 3453 and BIO 3453.) Generally offered: Spring. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 3463. Brain Diseases. (3-0) 3 Credit Hours.
Prerequisite: NDRB 3433. A study of selected major brain diseases and neurological disorders, their underlying causes and treatments, and an emphasis on molecular mechanisms. Generally offered: Fall. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 3623. Neuropsychopharmacology. (3-0) 3 Credit Hours.
Prerequisite: NDRB 3433. A study of the pharmacology of drugs that affect the function of the central nervous system. Topics include drug-receptor interactions, drugs of abuse, and drugs used to treat mental illness. (Formerly BIO 3623. Credit cannot be earned for both NDRB 3623 and BIO 3623.) Generally offered: Fall. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 3663. Human Embryology. (3-0) 3 Credit Hours.
Prerequisite: BIO 2313. Development of the human embryo from fertilization to the birth of the fetus. The origin of various tissues and organs will be followed during development. Environmental and genetic factors that can alter development will be discussed. (Formerly BIO 3663. Credit cannot be earned for both NDRB 3663 and BIO 3663.) Generally offered: Fall. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 3813. Cell Biology. (3-0) 3 Credit Hours.
Prerequisites: BIO 2313; prior completion of BIO 3513 is recommended. A study of cellular molecules and metabolic processes, synthesis and regulation of macromolecules, differential gene expression, membranes and organelles, cytoskeleton, cell cycle, and growth of normal and neoplastic cells. Credit cannot be earned for both NDRB 3813 and BME 3114. (Formerly BIO 3813, credit also cannot be earned for both NDRB 3813 and BIO 3813.) Generally offered: Fall, Spring, Summer. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 3913. Molecular Biology. (3-0) 3 Credit Hours.
Prerequisite: BIO 2313; prior completion of BIO 3513 is recommended. A study of nucleotides, DNA, replication, recombination, RNA, transcription, genetic code, translation, genomes, and chromosomes. (Formerly BIO 3913. Credit cannot be earned for both NDRB 3913 and BIO 3913.) Generally offered: Fall, Spring. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 3993. Principles of Cancer Biology. (3-0) 3 Credit Hours.
Prerequisite: BIO 1203 (formerly BIO 1404). A broad introduction to mechanisms that produce oncogenes and tumor suppressor genes. Methodologies of cancer assessment and prevention will be reviewed. (Formerly BIO 3933. Credit cannot be earned for both NDRB 3993 and BIO 3933.) Generally offered: Fall, Spring. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4143. Developmental Biology. (3-0) 3 Credit Hours.
Prerequisite: BIO 2313; prior completion of BIO 3813 is recommended. Overview of developmental biology focusing on the origins of classical concepts as well as modern molecular approaches. Emphasis will be placed on the mechanisms underlying developmental processes using both invertebrate and vertebrate examples. Subjects include axis formation, induction, morphogenesis, embryonic pattern formation, cell differentiation, and organogenesis. (Formerly BIO 4143. Credit cannot be earned for both NDRB 4143 and BIO 4143.) Generally offered: Fall. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4153. Frontiers in Pluripotent Stem Cells. (3-0) 3 Credit Hours.
Prerequisite: BIO 2313; prior completion of NDRB 3813 is recommended. The course covers interrelated topics such as pluripotency, cell fate specification, differentiation, patterning, organogenesis, morphogenesis, regeneration, and tissue engineering with an emphasis on human pluripotent stem cells and translational applications/emerging technologies related to regenerative medicine such as CRISPR/Cas9 gene editing and 3D organoids. Generally offered: Spring. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4453. Endocrinology. (3-0) 3 Credit Hours.
Prerequisite: BIO 2313. Molecular, cellular, and physiological effects of hormones in health and disease. Topics include molecular mechanisms of hormone action in reproductive physiology, growth and development, and defects in hormonal regulation underlying clinically important syndromes (e.g., diabetes, hypertension, osteoporosis, and cancer). (Formerly BIO 4453. Credit cannot be earned for both NDRB 4453 and BIO 4453.) Generally offered: Fall. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4483. Developmental Neuroscience: From Zygote to Brain Circuits. (3-0) 3 Credit Hours.
Prerequisites: BIO 2313, NDRB 3813, and NDRB 3433. A comparative developmental approach will be used to understand patterning mechanisms that control formation of the nervous system along the major axes of the body. Other topics include epigenetic mechanisms regulating neuronal plasticity and disease. Generally offered: Fall. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4583. Emergent Properties of Neural Circuits. (3-0) 3 Credit Hours.
Prerequisite: NDRB 3433. An exploration of how interesting and useful functions arise in networks of neurons based on fundamental principles of cellular neurophysiology, neuroanatomy, and neurochemistry. (Formerly BIO 4583. Credit cannot be earned for both NDRB 4583 and BIO 4583.) Generally offered: Spring. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4683. Neural Data Science. (3-0) 3 Credit Hours.
Prerequisites: MAT 1193, CS 1063 or DS 4013, STA 1403 or PSY 2073, and NDRB 2113. Analysis and interpretation of neurophysiological data, such as spike trains and EEG traces recorded from behaving animals or human subjects. While gaining hands-on computer-programming experience, this course will examine how neuroscientists use data analysis to investigate open questions. Lastly, more advanced “data science” techniques will tackle the complex data sets that arise from innovative brain-machine interfaces. Generally offered: Spring. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4783. Computational Neuroscience. (3-0) 3 Credit Hours.
Prerequisites: MAT 1193, CS 1063 or DS 4013, STA 1403 or PSY 2073, and NDRB 2113, or consent of the instructor. An introduction to brain modeling and computational approaches to brain function. Topics include neural coding and the computational properties of neurons and neuronal networks. Generally offered: Fall. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4813. Brain and Behavior. (3-0) 3 Credit Hours.
Prerequisite: NDRB 2113. This course explores the brain basis of behavior with a focus on understanding the neurophysiological, neurochemical, and neuroanatomical underpinnings for a variety of simple and complex behaviors. Students will explore topics such as sensation and perception, pain, movement, sleep, biological rhythms, emotions, addiction, learning and memory, and neurodevelopment. The topics are grounded with examples of typical human behavior and disorders such as Parkinson’s disease, Autism, Schizophrenia, and psychopathology. (Formerly BIO 4813. Credit cannot be earned for both NDRB 4813 and BIO 4813, nor PSY 4183.) Generally offered: Fall. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4823. Cognitive Neuroscience. (3-0) 3 Credit Hours.
Prerequisite: NDRB 3433, or NDRB 4813, or PSY 4183, or consent of instructor. The biological basis of cognition including perception, attention, learning, memory, emotion, language, and executive function. The course introduces students to the use of human neuroimaging experiments and clinical population, and research with other species, to study the brain basis of complex behavior and cognitive disorders, such as memory loss, language impairment, and developmental disorders. (Formerly BIO 4823. Credit cannot be earned for both NDRB 4823 and BIO 4823.) Generally offered: Spring. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4911. Independent Study. (0-0) 1 Credit Hour.
Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but no more than 6 semester credit hours will apply to a bachelor’s degree, regardless of discipline. Only 6 semester credit hours of NDRB 4911-3, NDRB 4923, and NDRB 4993, in any combination, can be taken as NDRB electives. Additional research hours of these courses (excluding Independent Study) may be taken as free electives, for a maximum of 12 research hours being applied to the bachelor’s degree. Generally offered: Fall, Spring, Summer. Differential Tuition: $50.

NDRB 4912. Independent Study. (0-0) 2 Credit Hours.
Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but no more than 6 semester credit hours will apply to a bachelor’s degree, regardless of discipline. Only 6 semester credit hours of NDRB 4911-3, NDRB 4923, and NDRB 4993, in any combination, can be taken as NDRB electives. Additional research hours of these courses (excluding Independent Study) may be taken as free electives, for a maximum of 12 research hours being applied to the bachelor’s degree. Generally offered: Fall, Spring, Summer. Differential Tuition: $100.

NDRB 4913. Independent Study. (0-0) 3 Credit Hours.
Independent reading, research, discussion, and/or writing under the direction of a faculty member. May be repeated for credit, but no more than 6 semester credit hours will apply to a bachelor’s degree, regardless of discipline. Only 6 semester credit hours of NDRB 4911-3, NDRB 4923, and NDRB 4993, in any combination, can be taken as NDRB electives. Additional research hours of these courses (excluding Independent Study) may be taken as free electives, for a maximum of 12 research hours being applied to the bachelor’s degree. Generally offered: Fall, Spring, Summer. Differential Tuition: $150.

NDRB 4923. Laboratory Research. (0-0) 3 Credit Hours.
Supervised laboratory research mentored by a faculty member engaged in active research within the student's designated area of concentration. May be repeated for credit, but no more than 6 semester credit hours will apply to a bachelor's degree. Only 6 semester credit hours of NDRB 4911-3, NDRB 4923, and NDRB 4993, in any combination, can be taken as NDRB electives. Additional research hours of these courses (excluding Independent Study) may be taken as free electives, for a maximum of 12 research hours being applied to the bachelor's degree. Generally offered: Fall, Spring, Summer. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4951. Special Studies. (1-0) 1 Credit Hour.
An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Studies may be repeated for credit when the topics vary, but no more than 6 semester credit hours will apply to a bachelor's degree, regardless of discipline. No more than 6 semester credit hours of NDRB 2953, NDRB 4951, or NDRB 4953 can be applied to a B.S. degree in Neuroscience. Generally offered: Fall, Spring, Summer. Differential Tuition: $50.

NDRB 4953. Special Studies. (3-0) 3 Credit Hours.
An organized course offering the opportunity for specialized study not normally or not often available as part of the regular course offerings. Special Studies may be repeated for credit when the topics vary, but no more than 6 semester credit hours will apply to a bachelor's degree, regardless of discipline. No more than 6 semester credit hours of NDRB 2953, NDRB 4951, or NDRB 4953 can be applied to a B.S. degree in Neuroscience. Generally offered: Fall, Spring, Summer. Differential Tuition: $150. Course fee: IUB1 $10.

NDRB 4993. Honors Research. (0-0) 3 Credit Hours.
Prerequisites: Enrollment limited to biology majors who are members of the Honors College, or who are pursuing College of Sciences Honors, and who are in their last two semesters of study; approval by the Honors College or College Honors Committee is required. Supervised research and preparation of an Honors Thesis. May be repeated for credit with approval, but no more than 6 semester credit hours will apply to a bachelor's degree, regardless of discipline. Only 6 semester credit hours of NDRB 4911-3, NDRB 4923, and NDRB 4993, in any combination, can be taken as NDRB electives. Additional research hours of these courses (excluding Independent Study) may be taken as free electives, for a maximum of 12 research hours being applied to the bachelor's degree. Generally offered: Fall, Spring. Generally offered: Fall, Spring. Differential Tuition: $150.