ADVANCED STUDIES IN BIOLOGY FOR HEALTH PROFESSIONS

SPS Certificate website: https://sps.northwestern.edu/premedicine-prohealth/advanced-biology-health-professions/

Advanced Studies in Biology for Health Professions draws students from a wide range of backgrounds who are interested in careers in medicine, physical therapy, physician assistant studies or other health careers. Students complete four to eight advanced undergraduate courses in biology to help them prepare for professional programs.

Certificate Offered


Advanced Studies in Biology for Health Professions Courses

**BIOL_SCI 115-CN The Human Brain (1 Unit)**
Overview of the development, structure and function of the human nervous system; terminology and principles of neuroanatomy, neurochemistry, physiology, and molecular biology. How the brain works and its role in human behavior and psychopathology. Issues raised by new medical technologies.

**BIOL_SCI 167-CN Genetics and Evolution (1 Unit)**
NPEP course.

**BIOL_SCI 170-CN Concepts of Biology (1 Unit)**
General biological sciences introduction. Topics include evolution, biomolecules, cell biology, genetics, population biology, and the relationship between structure and function in organisms. The course is geared toward students with an interest in the topic but without a background in biological sciences.

**BIOL_SCI 170-DL Concepts of Biology (1 Unit)**
General biological sciences introduction. Topics include evolution, biomolecules, cell biology, genetics, population biology, and the relationship between structure and function in organisms. The course is geared toward students with an interest in the topic but without a background in biological sciences.

**BIOL_SCI 170-PP Concepts of Biology (1 Unit)**
NPEP course.

**BIOL_SCI 201-CN Molecular Biology (1 Unit)**
Basics of molecular biology, including the structure of macromolecules, DNA replication, transcription, and translation and the mechanisms by which these processes are regulated. Current biotechnology methods used to study molecular biology. Credit not allowed for both BIOL_SCI 201-CN and BIOL_SCI 215-CN.

**BIOL_SCI 202-CN Cell Biology (1 Unit)**
How an evolutionary perspective informs our understanding of human anatomy, health and disease. Mechanisms the cell uses to compartmentalize and transport proteins, to move, to regulate growth and death, and to communicate with their environments.

**BIOL_SCI 203-CN Genetics and Evolution (1 Unit)**
Principles of inheritance; gene function; mechanisms by which DNA is replicated, transcribed into RNAs, and translated into proteins; basics of the process of natural selection.

**BIOL_SCI 215-CN Genetics and Molecular Biology (1 Unit)**
Principles of inheritance; gene function; mechanisms by which DNA is replicated, transcribed into RNAs, and translated into proteins; basics of the process of natural selection.

**BIOL_SCI 217-CN Physiology (1 Unit)**
Organization and functioning of the major organ systems in mammals.

**BIOL_SCI 219-CN Cell Biology (1 Unit)**
Mechanisms that cells use to compartmentalize and transport proteins, to move, to regulate growth and death, and to communicate with their environments.

**BIOL_SCI 220-CN Genetic and Molecular Processes Laboratory (0.34 Unit)**
Laboratory techniques and experiments in fundamental aspects of transmission genetics and molecular biology. Credit for this course is 0.34 units.

**BIOL_SCI 221-CN Cellular Processes Laboratory (0.34 Unit)**
Laboratory techniques and experiments in fundamental aspects of cell biology. Credit for this course is 0.34 units.

**BIOL_SCI 222-CN Investigative Lab (0.34 Unit)**
A culminating life-science lab experience. Credit for this course is 0.34 units.

**BIOL_SCI 223-CN Genetics and Molecular Processes Laboratory (0.34 Unit)**
Laboratory techniques and experience that investigates relevant scientific research and teaches scientific inquiry skills such as experimental design, writing research proposals, data collection, data analysis/interpretation, and the presentation of results. The experimental model revolves around atherosclerosis and macrophage phagocytosis of apoptotic cells. Various cell and molecular biology techniques. Should be taken concurrently with BIOL_SCI 202-CN Credit not allowed for both BIOL_SCI 221-CN and BIOL_SCI 232-CN.

**BIOL_SCI 232-CN Molecular and Cellular Processes Laboratory (0.34 Unit)**
Laboratory techniques and experience that investigates relevant scientific research and teaches scientific inquiry skills such as experimental design, writing research proposals, data collection, data analysis/interpretation, and the presentation of results. The experimental model revolves around aggregate prone proteins in nematodes and RNA
interference (RNAi) affecting protein folding and the clearance of protein aggregates. Various cell and molecular biology techniques.

Prerequisite: Students must have completed BIOL.SC 232-CN. Credit not allowed for both BIOL.SC 220-CN and BIOL.SC 233-CN.

BIOL.SC 234-CN Investigative Laboratory (0.34 Unit)

BIOL.SC 302-CN Fundamentals of Neurobiology (1 Unit)

Structure and function of the mammalian central nervous system from the molecular to behavioral level. Emphasis on fundamental concepts in neurobiology, including neuronal and glial structure and function, neurophysiology of membrane, resting and action potential, synaptic physiology, an introduction to sensory perception, neuronal plasticity in learning and memory.

Prerequisite: BIOL.SC 215-CN and BIOL.SC 219-CN. Recommended: BIOL.SC 308-CN.

BIOL.SC 302-DL Fundamentals of Neurobiology (1 Unit)

Structure and function of the mammalian central nervous system from the molecular to behavioral level. Emphasis on fundamental concepts in neurobiology, including neuronal and glial structure and function, neurophysiology of membrane, resting and action potential, synaptic physiology, an introduction to sensory perception, neuronal plasticity in learning and memory.

Prerequisite: BIOL.SC 215-CN and BIOL.SC 219-CN. Recommended: BIOL.SC 308-CN.

BIOL.SC 308-CN Biochemistry (1 Unit)

Basic concepts in biochemistry, emphasizing the structure and function of biological macromolecules, fundamental cellular biochemical processes, and the chemical logic in metabolic transformations.

Prerequisite: BIOL.SC 217-CN and CHEM 210-A.

BIOL.SC 312-CN The Evolutionary Biology of Human Anatomy, Health and Disease (1 Unit)

Key features of human anatomy, health and disease from an evolutionary perspective. Review of some evolutionary processes, overview of human evolutionary history, consideration of the primary body systems and regions in the human organism. The historical context of selected human structures and their function/dysfunction across these systems.

BIOL.SC 313-CN Human Anatomy (1 Unit)

An introduction to human anatomy. Topics include system approach to anatomical organization; sections of the body; musculoskeletal and nervous systems; embryology development. Lectures are supplemented by selected sections of human cadavers and dry exercises using bones, models, and computer animations.

Prerequisite: BIOL.SC 170-CN, or equivalent course.

BIOL.SC 313-DL Human Anatomy (1 Unit)

An introduction to human anatomy. Topics include system approach to anatomical organization; sections of the body; musculoskeletal and nervous systems; embryology development. Lectures are supplemented by selected sections of human cadavers and dry exercises using bones, models, and computer animations.

Prerequisite: BIOL.SC 170-CN, or equivalent course.

BIOL.SC 315-CN Advanced Cell Biology (1 Unit)

Relationship of shape, structural dynamics, and function with the cellular state and gene expression; cell-to-cell communication.

Prerequisite: BIOL.SC 219-CN.

BIOL.SC 316-CN Human Structure and Function (1 Unit)

The function of the musculoskeletal system in modern humans. A comparative perspective emphasizing the adaptive contexts of the evolutionary transformations leading to our modern anatomy. Structural, functional, and evolutionary anatomy of humans, with primary focus on the musculoskeletal system of the postcranium. General biomechanical principles of anatomical systems are covered through the regional anatomy of the muscles, bones and joints. Lectures are supplemented by selected sections of human cadavers, in-class lab sessions examining bones and models, and computer animations and exercises.

Prerequisite: BIOL.SC 313-CN, equivalent anatomy course, or permission of instructor.

BIOL.SC 317-CN Regional Human Anatomy Lab (0.34 Unit)

Lab course utilizing sections and demonstrations of human cadavers. It is an advanced anatomy course examining the details of human body systems. Topics include: body wall and cavities, contents and features of the thorax and abdomen (cardiac, pulmonary, and gastrointestinal systems), pelvis (genito-urinary system), spinal cord and back, innervation and blood supply of the upper and lower limbs, cranial cavities and contents, cranial nerves and blood supply of the head and neck. Credit for this course is 0.34 units.

Prerequisite: BIOL.SC 313-CN or equivalent.

BIOL.SC 318-CN Advanced Human Physiology (1 Unit)

Builds on concepts covered in BIOL.SC 217-CN or an equivalent physiology course focusing on the body as an integrated set of systems. A global view of the body, its systems, and the many processes that keep the systems working. Integrated approach to studying all major organ systems including neural, autonomic/somatic motor, endocrine, cardiovascular, respiratory, renal, digestive, and reproductive physiology. The clinical relevance of the organ system that will include abnormal function, disease states, and medications used to bring the system back to normal functioning.

Prerequisite: BIOL.SC 217-CN or equivalent.

BIOL.SC 318-DL Advanced Human Physiology (1 Unit)

Builds on concepts covered in BIOL.SC 217-CN or an equivalent physiology course focusing on the body as an integrated set of systems. A global view of the body, its systems, and the many processes that keep the systems working. Integrated approach to studying all major organ systems including neural, autonomic/somatic motor, endocrine, cardiovascular, respiratory, renal, digestive, and reproductive physiology. The clinical relevance of the organ system that will include abnormal function, disease states, and medications used to bring the system back to normal functioning.

Prerequisite: BIOL.SC 217-CN or equivalent.

BIOL.SC 325-CN Animal Physiology (1 Unit)

Physiological principles and mechanisms responsible for the ability of animals to regulate variables in the steady state.

Prerequisite: BIOL.SC 217-CN.

BIOL.SC 327-CN Biology of Aging (1 Unit)

Biological aspects of aging, from molecular to evolutionary.

Prerequisite: BIOL.SC 219-CN and BIOL.SC 217-CN.

BIOL.SC 328-A Microbiology Lab (0 Unit)

Laboratory section for BIOL.SC 328-CN.

BIOL.SC 328-CN Microbiology (1 Unit)

How microbes interact with their environments, including with humans.

Prerequisite: BIOL.SC 217-CN.

BIOL.SC 342-CN Evolutionary Processes (1 Unit)

Evolutionary mechanisms (natural selection, genetic drift), evolutionary history (speciation, phylogenetics), and adaptations (sex, cooperation, aging, life history).

Prerequisite: BIOL.SC 215-CN and BIOL.SC 219-CN.

BIOL.SC 355-CN Immunobiology (1 Unit)
Nature of host resistance; characteristics of antigens, antibodies; basis of immune response; hypersensitivity.

**Prerequisite:** BIOL_SCI 217-CN.

**BIOL_SCI 355-DL Immunobiology (1 Unit)**
Nature of host resistance; characteristics of antigens, antibodies; basis of immune response; hypersensitivity.

**Prerequisite:** BIOL_SCI 217-CN.

**BIOL_SCI 390-DL Advanced Molecular Biology (1 Unit)**
Builds on topics introduced in introductory Molecular Biology. Topics discussed include techniques, transcriptional and translational regulation, epigenetics, replication, regulatory RNAs, DNA repair, and genetic engineering.

**Prerequisite:** BIOL_SCI 215 or BIOL_SCI 201.