BIOLOGICAL SCIENCES

The biological sciences major develops and enhances the intellectual and creative potential of life sciences students, providing them with deep and current knowledge of human biology. Comprised of evening and Saturday courses taught by Northwestern faculty and researchers, the biological sciences major is a rigorous combination of Northwestern University science curriculum and courses in human biology that are unique to the School of Professional Studies.

Degrees Offered

- Biological Sciences, BSGS (https://catalogs.northwestern.edu/sps/undergraduate/biological-sciences/biological-sciences-bsgs/)

Biological Sciences Courses

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.
Prerequisite: Students must have completed, with a C- or better, BIOL_SCI 201-CN or 215-CN to register for this course. Should be taken concurrently with BIOL_SCI 232-CN. Credit not allowed for both BIOL_SCI 219-CN and BIOL_SCI 202-CN.

BIOL_SCI 203-CN Genetics and Evolution (1 Unit)
Fundamentals of genetics and evolution. From the rules of heredity to the complex genetics of humans, the methods and logic of genetics as applied to inheritance, development, neurobiology, and populations. The process and tempo of evolution, from natural selection to speciation, emphasizing how genetics plays a critical role.
Prerequisite: Students must have completed, with a C- or better, BIOL_SCI 202-CN or BIOL_SCI 219-CN to register for this course.

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 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 233-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 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_SCI 232-CN. Credit not allowed for both BIOL_SCI 220-CN and BIOL_SCI 233-CN.

BIOL_SCI 234-CN Investigative Laboratory (0.34 Unit)
A culminating life-science laboratory experience. Students design and generate reagents that can be used in larger experiments. Topics vary from year to year and typically involve sub-cloning of a specific gene fused to a reporter for detection.
Prerequisite: Students must have completed BIOL_SCI 233-CN. Credit not allowed for both BIOL_SCI 222-CN and BIOL_SCI 234-CN.

BIOL_SCI 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_SCI 201-CN or BIOL_SCI 215-CN and CHEM 215-A.

BIOL_SCI 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_SCI 201-CN or BIOL_SCI 215-CN, and BIOL_SCI 202-CN or BIOL_SCI 219-CN.

CHEM 110-CN Quantitative Problem Solving in Chemistry (1 Unit)
Solution strategies for traditional word problems and their application to basic chemistry quantitative problems: dimensional analysis, chemical equations, stoichiometry, limiting reagents.

CHEM 131-CN Fundamentals of Chemistry I (1 Unit)
Quantum mechanics, electronic structure, periodic properties of the elements, chemical bonding, thermodynamics, intermolecular forces, properties of solids and liquids, special topics in modern chemistry. Must be taken concurrently with CHEM 141-CN.
Prerequisite: grade of C- or higher in CHEM 110-CN.

CHEM 132-CN Fundamentals of Chemistry II (1 Unit)
Solutions and colligative properties, chemical equilibrium, aqueous solution equilibria, chemical kinetics, metals in chemistry and biology, oxidation-reduction reactions and electrochemistry, special topics in modern chemistry. Must be taken concurrently with CHEM 142-CN.
Prerequisite: grade of C- or higher in CHEM 131-CN and CHEM 141-CN.

CHEM 141-CN Fundamentals of Chemistry Laboratory I (0.34 Unit)
Chemical analysis of real samples using basic laboratory techniques including titration, colorimetric analysis, density measurements, and atomic spectroscopy. Planning, data collection, interpretation, and reporting on experiments. Credit for this course is 0.34 units. Must be taken concurrently with CHEM 131-CN.
Prerequisite: grade of C- or higher in CHEM 110-CN.

CHEM 142-CN Fundamentals of Chemistry Laboratory II (0.34 Unit)
Chemistry laboratory techniques applied to materials science and nanotechnology, acid-base chemistry, and chemical kinetics. Planning, data collection, interpretation, and reporting on experiments. The course must be taken concurrently with CHEM 132-CN. Credit for this course is 0.34 units.
Prerequisite: grade of C- or higher in CHEM 131-CN.

CHEM 215-A Organic Chemistry I (1 Unit)
Foundational concepts in organic chemistry will be introduced. Topics include structure and properties of common functional groups, acidity/basicity, conformational analysis, stereochemistry, and reactivity of organic compounds. The chemistry of hydrocarbons, alkyl halides, and alcohols, ethers, and carbonyl compounds included.

Prerequisite: CHEM 132-CN and CHEM 142-CN (C– or better in all listed courses) or permission of department by placement exam. Must be taken concurrently with CHEM 235-A.

CHEM 215-B Organic Chemistry II (1 Unit)
Fundamental concepts in organic chemistry will be covered. Topics include important functional groups: nomenclature, structure, properties, and multi-step synthesis. Reaction mechanisms for organic transformations presented, and synthesis strategies covered. The chemistry of pi systems and aromatic ring system, amines, and carboxylic acids and their derivatives, and enol/enolate species included.
Prerequisite: CHEM 215-A and CHEM 235-A (C– or better). Must be taken concurrently with CHEM 235-B.

CHEM 235-A Organic Chemistry Lab I (0.34 Unit)
Standard laboratory techniques in organic chemistry will be covered. Techniques will focus on the isolation and purification of organic compounds as well as the use of spectroscopic methods to determine identity and purity.
Prerequisite: CHEM 132-CN and CHEM 142-CN (C– or better in all listed courses) or permission of department by placement exam. Must be taken concurrently with CHEM 215-A.

CHEM 235-B Organic Chemistry Lab II (0.34 Unit)
Complete laboratory experiments focusing on standard synthetic organic chemistry conducted each week. Students complete prelab worksheet including stoichiometric calculations, prediction of reaction outcome, and identification of safety protocols.
Prerequisite: CHEM 215-A and CHEM 235-A (C- or better). Must be taken concurrently with CHEM 215-B.

MATH 220-A Single-Variable Differential Calculus (1 Unit)
Limits. Differentiation. Linear approximation and related rates. Extreme value theorem, mean value theorem, and curve-sketching. Optimization.

MATH 220-B Single-Variable Integral Calculus (1 Unit)
Definite integrals, antiderivatives, and the fundamental theorem of calculus. Transcendental and inverse functions. Areas and volumes. Techniques of integration, numerical integration, and improper integrals. First-order linear and separable ordinary differential equations.
Prerequisite: MATH 220-A.

PHYSICS 130-A College Physics I (1 Unit)
First quarter of a three-quarter algebra-based physics course with lecture and laboratory. Physics is the most basic of the sciences, dealing with the behavior and structure of matter. Lectures and labs illustrate physical principles: mechanics, motion, momentum and energy, and fluids. Continues in winter and spring quarters as PHYSICS 130-B, PHYSICS 130-C. Must be taken concurrently with PHYSICS 131-A lab.
Prerequisite: college algebra or higher college math course.

PHYSICS 130-B College Physics II (1 Unit)
Continuation of PHYSICS 130-A algebra-based physics with lecture and laboratory; the sequence concludes with PHYSICS 130-C in the spring quarter. Harnessing the forces of electrical power; how they have altered the way we live and perceive ourselves in the universe. Lecture demonstrations illustrate physical principles: electricity and magnetism, DC and AC circuits. Must be taken concurrently with PHYSICS 131-B lab.
Prerequisite: PHYSICS 130-A or equivalent course.

PHYSICS 130-C College Physics III (1 Unit)
Continuation of PHYSICS 130-A, PHYSICS 130-B. Wave motion, optics, and introduction to the basic concepts of modern physics including quantum mechanics, relativity, and atomic physics. Focus on conceptual understanding of basic physical principles and their real-world applications. Demonstration experiments will be used to illustrate physical phenomena and concepts. Must be taken concurrently with PHYSICS 131-C lab.
Prerequisite: PHYSICS 130-A, PHYSICS 130-B or equivalent course.

PHYSICS 131-A Physics Laboratory I (0.34 Unit)
Laboratory course associated with PHYSICS 130-A; must be taken concurrently. Credit for this course is .34 units.

PHYSICS 131-B Physics Laboratory II (0.34 Unit)
Laboratory course associated with PHYSICS 130-B; must be taken concurrently. Credit for this course is .34 units.

PHYSICS 131-C Physics Laboratory III (0.34 Unit)
Laboratory course associated with PHYSICS 130-C; must be taken concurrently. Credit for this course is .34 units.

STAT 202-DL Introduction to Statistics and Data Science (1 Unit)
This course provides an introduction to the basic concepts of statistics. Throughout the course, students will learn to: summarize data using graphs and tables; explain/calculate descriptive statistics, confidence intervals, correlation, regression, and probability; and explain tests of significance and data-production including sampling and experiments. Basic knowledge of algebra is recommended.

BIOL_SCI 302-DL Fundamentals of Neurobiology (1 Unit)
Structure and function of the mammalian central nervous system from the molecular to behavioral level. Emphasis on foundational 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_SCI 201-CN or BIOL_SCI 215-CN, and BIOL_SCI 202-CN or BIOL_SCI 219-CN. Recommended: BIOL_SCI 308-CN.

BIOL_SCI 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_SCI 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 prosections of human cadavers and dry exercises using bones, models, and computer animations.
Prerequisite: BIOL_SCI 170-CN, or equivalent course.

BIOL_SCI 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_SCI 202-CN or BIOL_SCI 219-CN.

BIOL_SCI 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 prosections of human cadavers, in-class lab sessions examining bones and models, and computer animations and exercises.
Prerequisite: BIOL_SCI 313-CN, equivalent anatomy course, or permission of instructor.

BIOL_SCI 318-DL Advanced Human Physiology (1 Unit)
Builds on concepts covered in BIOL_SCI 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_SCI 310-CN or equivalent.

BIOL_SCI 327-CN Biology of Aging (1 Unit)
Biological aspects of aging, from molecular to evolutionary.
Prerequisite: BIOL_SCI 201-CN or BIOL_SCI 215-CN, and BIOL_SCI 202-CN or BIOL_SCI 219-CN.

BIOL_SCI 328-CN Microbiology (1 Unit)
How microbes interact with their environments, including with humans.
Prerequisite: BIOL_SCI 201-CN or BIOL_SCI 215-CN, and BIOL_SCI 202-CN or BIOL_SCI 219-CN.

BIOL_SCI 355-DL Immunobiology (1 Unit)
Nature of host resistance; characteristics of antigens, antibodies; basis of immune response; hypersensitivity.
Prerequisite: BIOL_SCI 201-CN, BIOL_SCI 202-CN, and BIOL_SCI 308-CN or equivalent.