

# BIOLOGICAL SCIENCES (BIOL\_SCI)

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**BIOL\_SCI 100-0 Introduction to Biological Sciences at Northwestern (1 Unit)** For participants in Bio&ChemEXCEL summer program. An overview of recent advances in biological research and leadership within the field of biology. Taken with CHEM 100-0. *Natural Sciences Distro Area*

**BIOL\_SCI 101-6 First-Year Seminar (1 Unit)** *WCAS First-Year Seminar*

**BIOL\_SCI 102-6 First-Year Seminar (1 Unit)** *WCAS First-Year Seminar*

**BIOL\_SCI 103-0 Diversity of Life (1 Unit)** Comparative survey of organisms, emphasizing adaptation and phylogenetic relationships. Particular emphasis on animals. *Natural Sciences Distro Area*

**BIOL\_SCI 103-6 First-Year Seminar (1 Unit)** *WCAS First-Year Seminar*

**BIOL\_SCI 104-0 Plant-People Interactions (1 Unit)** Biology and history of the interaction of humans and flowering plants. *Natural Sciences Distro Area*

**BIOL\_SCI 104-6 First-Year Seminar (1 Unit)** *WCAS First-Year Seminar*

**BIOL\_SCI 105-6 First-Year Seminar (1 Unit)** *WCAS First-Year Seminar*

**BIOL\_SCI 106-6 First-Year Seminar (1 Unit)** *WCAS First-Year Seminar*

**BIOL\_SCI 107-6 First-Year Seminar (1 Unit)** *WCAS First-Year Seminar*

**BIOL\_SCI 108-6 First-Year Seminar (1 Unit)**

**BIOL\_SCI 109-0 The Nature of Plants (1 Unit)** Plant adaptations for growth, survival, and reproduction. Plant defense against herbivory, pollination, and seed dispersal. *Natural Sciences Distro Area*

**BIOL\_SCI 109-6 First-Year Seminar (1 Unit)**

**BIOL\_SCI 110-6 First-Year Seminar (1 Unit)**

**BIOL\_SCI 111-6 First-Year Seminar (1 Unit)**

**BIOL\_SCI 112-6 First-Year Seminar (1 Unit)**

**BIOL\_SCI 115-6 First-Year Seminar (1 Unit)** For participants in the NUBioscientist program. Biological Thought & Action; preparatory to BIOL\_SCI 116-6. *WCAS First-Year Seminar*

**BIOL\_SCI 116-6 First-Year Seminar (1 Unit)** For participants in the NUBioscientist program. Science Research Preparation; follows BIOL\_SCI 115-6. *WCAS First-Year Seminar*

**BIOL\_SCI 150-0 Human Genetics (1 Unit)** Basic principles of human inheritance and genetic variation. *Natural Sciences Distro Area*

**BIOL\_SCI 160-0 Human Reproduction (1 Unit)** Basic biology of reproduction; relation between hormones, emotions, intelligence, and behavior; related policy issues. *Natural Sciences Distro Area*

**BIOL\_SCI 164-0 Genetics and Evolution (1 Unit)** Principles of inheritance as they apply to evolution. May not receive credit after taking BIOL\_SCI 215-0. *Natural Sciences Distro Area*

**BIOL\_SCI 213-0 Undergraduate Laboratory Teaching Assistant (0 Unit)** Prerequisite: consent of instructor.

**BIOL\_SCI 215-0 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. Prerequisite: CHEM 131-0, CHEM 151-0, or CHEM 171-0. *Natural Sciences Distro Area*

**BIOL\_SCI 217-0 Physiology (1 Unit)** Organization and functioning of the major organ systems in mammals. Prerequisite: CHEM 131-0, CHEM 151-0, or CHEM 171-0. *Natural Sciences Distro Area*

**BIOL\_SCI 219-0 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. Prerequisite: CHEM 131-0, CHEM 151-0, or CHEM 171-0. *Natural Sciences Distro Area*

**BIOL\_SCI 220-0 Genetics and Molecular Processes Laboratory (0.34 Unit)** Laboratory techniques and experiments in fundamental aspects of transmission genetics and molecular biology. Prerequisite: CHEM 131-0, CHEM 151-0, or CHEM 171-0.

**BIOL\_SCI 221-0 Cellular Processes Laboratory (0.34 Unit)** Laboratory techniques and experiments in fundamental aspects of cell biology. Prerequisite: BIOL\_SCI 220-0.

**BIOL\_SCI 222-0 Investigative Laboratory (0.34 Unit)** A culminating life-science lab experience. Prerequisite: BIOL\_SCI 221-0.

**BIOL\_SCI 240-0 Molecular and Cell Biology for ISP (1 Unit)** Cell biology, transcription, translation, regulation of gene expression. Prerequisite: ISP standing.

**BIOL\_SCI 241-0 Biochemistry for ISP (1 Unit)** Synthesis and metabolism of organic molecules; structure and function of proteins. Prerequisites: ISP standing and previous or concurrent registration in CHEM 212-1.

**BIOL\_SCI 301-0 Principles of Biochemistry (1 Unit)** Biochemical processes. May not receive credit for both BIOL\_SCI 301-0 and BIOL\_SCI 308-0. Prerequisite: CHEM 210-2 or CHEM 212-2. *Natural Sciences Distro Area*

**BIOL\_SCI 302-0 Fundamentals of Neurobiology (1 Unit)** Cellular and biochemical approaches to the nervous system, focusing on neuron structure and function. May not receive credit for both BIOL\_SCI 302-0 and NEUROSCI 202-0. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 303-0 Molecular Neurobiology (1 Unit)** Exploration of the overlap between neurobiology and molecular biology. Prerequisite: BIOL\_SCI 302-0 or NEUROSCI 311-0.

**BIOL\_SCI 305-0 Neurobiology Laboratory (1 Unit)** Hands-on experience in the performance of experiments in cellular neurophysiology. Prerequisites: BIOL\_SCI 222-0; BIOL\_SCI 302-0 or NEUROSCI 311-0.

**BIOL\_SCI 307-0 Brain Structure, Function, and Evolution (1 Unit)** An overview of the evolution of the nervous system and cognition, from the origin of neurons to the structure and function of the human brain. No P/N. Prerequisites: BIOL\_SCI 302-0, BIOL\_SCI 325-0, or BIOL\_SCI 344-0. *Natural Sciences Distro Area*

**BIOL\_SCI 308-0 Biochemistry (1 Unit)** Fundamental biochemical processes in cells. May not receive credit for both BIOL\_SCI 308-0 and BIOL\_SCI 301-0. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 217-0, BIOL\_SCI 219-0; CHEM 210-2 or CHEM 212-2. *Natural Sciences Distro Area*

**BIOL\_SCI 315-0 Advanced Cell Biology (1 Unit)** Relationship of shape, structural dynamics, and function with the cellular state and gene expression; cell-to-cell communication. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 319-0 Biology of Animal Viruses (1 Unit)** Virus structure, synthesis of viral nucleic acids and proteins, the interaction of the viral and cellular genomes. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 323-0 Bioinformatics: Sequence and Structure Analysis (1 Unit)** Use of informational and modeling techniques to explore evolutionary and other problems related to the genome. Prerequisites: BIOL\_SCI 241-0, BIOL\_SCI 301-0, or BIOL\_SCI 308-0.

**BIOL\_SCI 325-0 Animal Physiology (1 Unit)** Physiological principles and mechanisms responsible for the ability of animals to regulate variables in the steady state. Prerequisite: BIOL\_SCI 217-0.

**BIOL\_SCI 326-0 Neurobiology of Learning and Memory (1 Unit)** Molecular and neural bases of memory. May not receive credit for both BIOL\_SCI 326-0 and NEUROSCI 326-0. Prerequisite: BIOL\_SCI 302-0 or NEUROSCI 311-0.

**BIOL\_SCI 327-0 Biology of Aging (1 Unit)** Biological aspects of aging, from molecular to evolutionary. Prerequisites: BIOL\_SCI 219-0.

**BIOL\_SCI 328-0 Microbiology (1 Unit)** How microbes interact with their environments, including with humans. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0, BIOL\_SCI 222-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 330-0 Plant Biology (1 Unit)** Plant structure, physiology, photosynthesis, evolutionary diversity, and ecology. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0.

**BIOL\_SCI 332-0 Conservation Genetics (1 Unit)** Critical issues in the management and understanding of endangered populations. Prerequisite: BIOL\_SCI 215-0 or ENVR\_SCI 202-0.

**BIOL\_SCI 334-0 Soils and the Environment: The Earth's Critical Zone (1 Unit)** Soil development and morphology; physical, chemical, hydrologic, and biological properties of soils. Prerequisite: BIOL\_SCI 215-0 or ENVR\_SCI 202-0.

**BIOL\_SCI 336-0 Spring Flora (1 Unit)** Life cycles, vegetative and reproductive structures, and adaptations for pollination and fruit and seed dispersal of the wildflowers, trees, and shrubs of oak woodland. Prerequisite: BIOL\_SCI 215-0 or ENVR\_SCI 202-0.

**BIOL\_SCI 337-0 Quantitative Methods for Ecology and Conservation (1 Unit)** Approaches, methods, and techniques for analyzing datasets in ecology and conservation biology. Prerequisites: BIOL\_SCI 215-0 or ENVR\_SCI 202-0; a course in statistics.

**BIOL\_SCI 339-0 Critical Topics in Ecology and Conservation (1 Unit)** Seminar discussing historical and modern publications in the field. Prerequisite: BIOL\_SCI 215-0 or ENVR\_SCI 202-0.

**BIOL\_SCI 341-0 Population Genetics (1 Unit)** Processes that affect allele frequency change and thus cause evolution. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; a course in statistics.

**BIOL\_SCI 342-0 Evolutionary Processes (1 Unit)** Evolutionary mechanisms (natural selection, genetic drift), evolutionary history (speciation, phylogenetics), and adaptations (sex, cooperation, aging,

life history). Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; a course in statistics.

**BIOL\_SCI 344-0 Anatomy of Vertebrates (1 Unit)** Vertebrate phylogeny illustrated via comparative morphology; anatomical/ functional and ontogenetic considerations; dissections. Prerequisite: BIOL\_SCI 103-0, BIOL\_SCI 164-0, or BIOL\_SCI 215-0; BIOL\_SCI 220-0

**BIOL\_SCI 345-0 Topics in Biology (1 Unit)** Topics vary but always deal with an area of advanced study in the life sciences. With laboratory. May be repeated for credit with different topic. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0, BIOL\_SCI 222-0.

**BIOL\_SCI 346-0 Field Ecology (1 Unit)** An intensive experience in field ecological research. Prerequisites: BIOL\_SCI 215-0; a course in statistics.

**BIOL\_SCI 347-0 Conservation Biology (1 Unit)** Evolution, ecology, and conservation of patterns of biological diversity. Prerequisites: BIOL\_SCI 215-0 or ENVR\_SCI 202-0; a course in statistics.

**BIOL\_SCI 349-0 Plant Community Ecology (1 Unit)** Abundance, distribution, diversity, and scaling in plant communities in space-time. Prerequisite: BIOL\_SCI 330-0.

**BIOL\_SCI 350-0 Plant Evolution and Diversity Lab (1 Unit)** Introduction to the diversity and evolutionary history of land plants. Prerequisite: BIOL\_SCI 330-0.

**BIOL\_SCI 353-0 Molecular Biology Laboratory (1 Unit)** Project-based approach to learning lab skills in eukaryotic molecular biology. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 354-0 Quantitative Analysis of Biology (1 Unit)** Random genetic processes, gene expression, cell adaptation, cell cycle, developmental morphogens, phylgenomics. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; MATH 220-0 or MATH 224-0; PHYSICS 130-1, PHYSICS 130-2, PHYSICS 130-3 or PHYSICS 135-1, PHYSICS 135-2, PHYSICS 135-3. *Natural Sciences Distro Area*

**BIOL\_SCI 355-0 Immunobiology (1 Unit)** Nature of host resistance; characteristics of antigens, antibodies; basis of immune response; hypersensitivity. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0, BIOL\_SCI 222-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 356-0 Endocrinology (1 Unit)** Physiology and biochemistry of hormones and glands of internal secretion in vertebrates; endocrine glands. Prerequisite: BIOL\_SCI 325-0.

**BIOL\_SCI 358-0 Advanced Physiology Laboratory (1 Unit)** Experiments in several physiological systems. Design, techniques, data analysis, and report writing emphasized. Prerequisites: BIOL\_SCI 217-0, BIOL\_SCI 222-0.

**BIOL\_SCI 359-0 Quantitative Experimentation in Biology (1 Unit)** Laboratory in experimental methods in quantitative biology. Random genetic processes, gene expression, cell cycle, developmental morphogens, genome sequencing. Prerequisites: BIOL\_SCI 354-0 and permission of instructor. *Natural Sciences Distro Area*

**BIOL\_SCI 360-0 Principles of Cell Signaling (1 Unit)** Emphasis on principles, components, and logic that are common to different cell signaling systems. Modern experimental strategies for studying cellular signaling as well as the implications of disrupting cell communication

pathways in disease will be described. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0

**BIOL\_SCI 361-0 Protein Structure and Function (1 Unit)** Structure and function of proteins; x-ray crystallography and NMR. Prerequisite: BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 363-0 Biophysics (1 Unit)** Protein interaction with small molecules; protein tertiary structure determination. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 378-0 Functional Genomics (1 Unit)** Patterns of gene expression and their causes. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; a course in statistics.

**BIOL\_SCI 380-0 Biology of Cancer (1 Unit)** The disease of cancer: causation at the cell and molecular levels; treatment. Prerequisites: BIOL\_SCI 315-0 or BIOL\_SCI 390-0.

**BIOL\_SCI 390-0 Advanced Molecular Biology (1 Unit)** Nucleic acid structure; DNA mutation, repair, recombination, replication, restriction, and modification; translation. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 391-0 Development and Evolution of Body Plans (1 Unit)** Molecular mechanisms underlying early embryonic development, including establishment of the body and organogenesis. Discussion of original literature. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 392-0 Developmental Genetics Laboratory (1 Unit)** Development of independent projects alongside classic readings and experiments exploring key concepts in developmental biology. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0, BIOL\_SCI 222-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0.

**BIOL\_SCI 393-0 Genetic Analysis (1 Unit)** Advanced transmission and regulatory genetics. Prerequisites: BIOL\_SCI 215-0, BIOL\_SCI 219-0; BIOL\_SCI 301-0 or BIOL\_SCI 308-0. *Natural Sciences Distro Area*

**BIOL\_SCI 395-0 Molecular Genetics (1 Unit)** Exploration of recent advances that have revolutionized the fields of gene expression and cell regulation. Discussion of articles and primary research papers. Prerequisite: BIOL\_SCI 378-0, BIOL\_SCI 390-0, or BIOL\_SCI 393-0.

**BIOL\_SCI 397-0 Senior Thesis Colloquium (1 Unit)** Supervision while writing a Senior Thesis. Discussion of students' research. Instructor feedback on thesis drafts. Continued student research. Enrollment limited to Senior Biological Sciences majors hoping to graduate with Program Honors and/or to produce a Senior Thesis. Registration required for all Honors candidates.

**BIOL\_SCI 398-0 Tutorial in Biology (1 Unit)** Supervised reading and discussion or supervised laboratory work. P/N only.

**BIOL\_SCI 399-0 Independent Research (1 Unit)** Supervised independent research project. Prerequisite: BIOL\_SCI 398-0 or previous BIOL\_SCI 399-0.