BIO 100 PRINCIPLES OF BIOLOGY
3, 3/0; NS14
Non-majors only. The unifying principles of modern biology with special emphasis on cell biology, metabolism, and genetics. Offered every semester.

BIO 101 HUMAN BIOLOGY
3, 3/0; NS14
Non-majors only. Biological principles of the human condition with particular emphasis on physiology of normal body function with regard to nutrition, disease, psychoactive agents, reproduction and contraception, and aging. Contemporary health-related issues. Offered every semester.

BIO 104 ENVIRONMENTAL BIOLOGY
3, 3/0; NS14

BIO 111 FOUNDATIONS OF BIOLOGY
3, 3/0
A molecular and cellular approach to understanding human biology. Emphasis on biomolecules, cell structure and function, cell division, genetics, gene expression, and biotechnology as they pertain to understanding human biology and human health. Offered every semester.

BIO 189 TOPIC COURSE
1, 0/3
See the Undergraduate Course Catalog (http://catalog.buffalostate.edu/undergraduate/docs/currentugcat.pdf).

BIO 210 MICROBIOLOGY
3, 2/2
Prerequisite: BIO 100 or BIO 111. Non-majors only. Morphology and physiology of bacteria. General application to household science, sanitation, hygiene, and infectious disease. Offered fall only.

BIO 211 INTRODUCTION TO CELL BIOLOGY AND GENETICS
4, 3/3

BIO 213 INTRODUCTION TO ECOLOGY, EVOLUTION, AND BEHAVIOR
4, 3/3
Prerequisite: BIO 111, C or better. Population, community and ecosystem ecology; human impact on the environment. The Darwinian revolution, evolution of populations and the formation of new species. Principles of animal behavior. Offered every semester.

BIO 295 RESEARCH EXPERIENCE IN BIOLOGY
1-3, 0/0
Prerequisite: Instructor Permission. Scholarship or creative work conducted under the supervision of a faculty member. Offered occasionally.

BIO 300 BIOSTATISTICS
4, 3/3
Prerequisites: Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213; Upper-division status. Statistical inference as a guide to decision making during biological investigations. Elements of experimental design. Exploratory data analysis. Tabular, graphical, and written interpretation of results. Application of inferential techniques including confidence intervals, t-tests, analysis of variance, chi-square analysis of contingency tables, and linear regression and correlation. Offered spring only.

BIO 301 CELL PHYSIOLOGY
4, 3/3
Prerequisites: BIO 111 (with a grade of C or better), BIO 211, BIO 213, CHE 111 and CHE 112/114. Basic concepts in cell physiology with an emphasis on transport across cell membranes, cell communication, and excitability of nerve and muscle cells. Labs introduce students to a variety of techniques employed to study cell physiology including biochemistry, cellular electrophysiology, and fluorescence microscopy. Offered alternate years.

BIO 303 GENETICS
4, 3/3
Prerequisites: BIO 111 (with a grade of C or better), BIO 211, BIO 213, CHE 111 and CHE 112/114. Principles of Mendelian, molecular and population genetics. Classic and molecular experimental methods for studying of gene structure, transmission, expression. Offered every fall semester.

Equivalent Course: BIO 303W

BIO 305 MOLECULAR BIOLOGY
4, 3/1
Prerequisites: BIO 111 (grade of C or better), BIO 211, BIO 213, CHE 111, CHE 112/114 and CHE 201. Structure, organization, and function in living matter at the molecular level. Offered alternate years.
BIO 308 HUMAN ANATOMY AND PHYSIOLOGY  
3, 3/0  
Prerequisites: BIO 100 or BIO 111, and upper-division status. Physiology and pertinent anatomy of the major organ systems of the human body including consideration of clinical health and disease. Not applicable as a biology elective for students pursuing a B.A. in biology. Offered each fall semester.

BIO 309 LABORATORY IN HUMAN ANATOMY AND PHYSIOLOGY  
1, 0/3  
Prerequisites: BIO 100 or BIO 111 and upper-division status. Human anatomy and functions of the major anatomical systems using the techniques of rigorous animal dissection (e.g., cats and sheep organs) and physiological experiments. Not applicable as a biology elective for students pursuing a B.A. in biology. Offered occasionally.

BIO 311 HUMAN ANATOMY AND PHYSIOLOGY I  
4, 3/2  
Prerequisites: BIO 100 or BIO 101 or BIO 111 and upper class standing. Study of the basic physiology of cells, tissues and the following human body systems: cardiovascular, respiratory, digestive, urinary and reproductive. Offered each fall semester.

BIO 312 HUMAN ANATOMY AND PHYSIOLOGY II  
4, 3/2  
Prerequisite: BIO 311 and upper class standing. The study of the physiology and related anatomy of the following human body systems: integumentary, skeletal, muscular, nervous, sensory and endocrine. Written essays and reports will be required. Offered every spring semester.

BIO 314 ADVANCED CELL BIOLOGY  
4, 3/3; CT14, IM14, WIIF  
Prerequisites: BIO 111 (grade of C or better), BIO 211, BIO 213, CHE 111, CHE112/114 and CHE 201. Current models of eukaryotic cell structure and function. Topics include: membrane transport, electrical properties of membranes, protein targeting, membrane trafficking, cytoskeleton, cell signaling, control of the cell cycle and cancer. Offered every spring semester.  
Equivalent Course: BIO 314W

BIO 315 ECOLOGY  
4, 3/3; WIIF  
Prerequisites: Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213. Ecosystems, biotic communities, interspecific and intraspecific relationships, biogeoclimatic cycles, energy flow, population ecology, introduction to analysis of community composition, effects of humanity in modifying natural environments. Several half-day or all-day field trips may be required. Offered fall only.  
Equivalent Course: BIO 315W

BIO 316 GENERAL MICROBIOLOGY  
4, 2/6  
Prerequisites: BIO 111 (with a grade of C or better), BIO 211, BIO 213 and CHE 111. Microorganisms and techniques of observing their morphology, growth characteristics, and distribution. The relationship of microorganisms to human activities. Offered spring only.  
Equivalent Course: BIO 316W

BIO 321 COMPARATIVE VERTEBRATE ANATOMY  
4, 3/3  
Prerequisites: Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213. Function, evolution, and development of the diversity of vertebrate structure. Rigorous dissections of representative vertebrate morphologies (e.g., preserved sharks, amphibians, cats, etc.). Offered occasionally.

BIO 322 HUMAN HEREDITY  
3, 3/0  
Prerequisites: BIO 100 and upper-division status. Non-majors only. Human inheritance and the social implications of genetics to modern society.

BIO 324 BIOLOGY OF HUMAN REPRODUCTION  
3, 3/0  
Prerequisites: BIO 100 and upper-division status. Non-majors only. Anatomy and physiology of the human reproductive system, development of the human embryo, and the processes of birth and lactation.  
Equivalent Course: BIO 324W

BIO 325 ICHTHYOLOGY  
4, 3/3  
Prerequisites: Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213. Study of the biology of fishes: structure and function (anatomy and physiology), systematics, evolution, diversity, zoogeography, and ecology. Offered alternate years.

BIO 333 BIOLOGICAL FORM, FUNCTION AND DIVERSITY  
4, 3/3  
Prerequisites: Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213. The origin and history of life on Earth and its diversification with an emphasis on Eukarya. Survey of the morphology, physiology, development, reproduction, and life cycles of protists, plants, fungi, and animals. Offered every spring semester.

BIO 350 GENES IN POPULATIONS  
4, 3/3  
Prerequisites: BIO 111 (with a grade of C or better), BIO 211, BIO 213 and CHE 111; Upper-division status. Processes that cause populations to change over time; mutation, natural selection, genetic drift, and gene flow. Application of population genetic principles to problems in conservation biology and forensic genetic analysis. Offered occasionally.

BIO 361 BIOLOGY SEMINAR  
1, 0/0  
Participation in weekly seminars on topics ranging from ecology and evolution to biomedical sciences and cell biology.

BIO 362 BIOLOGY SEMINAR  
1, 0/0  
Participation in weekly seminars on topics ranging from ecology and evolution to biomedical sciences and cell biology.

BIO 389 TOPIC COURSE  
1-6, 1/0  
See the Undergraduate Course Catalog (http://catalog.buffalostate.edu/undergraduate/docs/currentugcat.pdf). Equivalent Course: BIO 389W
BIO 402 COMPARATIVE ANIMAL PHYSIOLOGY 4, 3/3
Prerequisites: BIO 111 (with a grade of C or better), BIO 211, BIO 213 and BIO 333. Study of hormonal control, neural processing, sensory mechanisms, circulation, gas exchange, digestion, muscles, energetics, and thermoregulation using vertebrate and invertebrate examples. Offered alternate years.

BIO 405 EVOLUTION 3, 3/0; CT14, IM14, WIIF
Prerequisites: Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213; Upper-division status. The pattern of evolution including fossil, biogeographic, and genomic evidence. Phylogenies; processes contributing to changing allele frequencies in populations through time including selection, drift, mutation, migration, and nonrandom mating; models of speciation. Mendelian framework for quantitative genetics. Sexual selection, inclusive fitness, altruism and the evolution of eusociality. Mass extinction and recent discoveries related to human origins. Offered at least once a year.
Equivalent Course: BIO 405W

BIO 408 PLANT PHYSIOLOGY 4, 3/3
Prerequisites: Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213. Plant physiological processes including photosynthesis, respiration, transpiration, translocation, photomorphogenesis and tropisms; plant water potential, effects of hormones, soil nutrients, environmental stress; plant anatomy in relation to physiological function; use of instrumentation to measure physiological performance. Offered alternate years.

BIO 412 EMBRYOLOGY 4, 3/3
Prerequisites: BIO 212, BIO 214, and CHE 201/203 or BIO 305. Principles and processes of a chordate embryology with emphasis on cellular and molecular mechanisms of development. Offered occasionally.

BIO 414 MAMMALOLOGY 4, 3/3
Prerequisites: Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213. Introduction to the study of mammals; including classification, distribution, ecology, and behavior as they relate to life histories of mammals; identification of mammals in the field and laboratory; and field methods of mammalian studies. Offered occasionally.

BIO 418 LIMNOLOGY 4, 3/3
Prerequisites: BIO 111 (with a grade of C or better), BIO 211, BIO 213 and CHE 111; Upper-division status. Physical, chemical, and biological factors that influence freshwater life and the ecological interactions in freshwater communities. Lectures, demonstrations, and field trips. Offered alternate years.

BIO 421 INVERTEBRATE STRUCTURE AND FUNCTION 3, 2/2
Prerequisites: BIO 111 (with a grade of C or better), BIO 211, BIO 213 and BIO 333. Functional approach to the morphology, physiology, adaptation, ecology, reproduction, and evolution of invertebrates. Offered occasionally.

BIO 428 VERTEBRATE STRUCTURE AND FUNCTION 4, 3/3
Prerequisites: BIO 212 and BIO 213. Comparative study of vertebrates with emphasis on their anatomy, adaptations, ecology, and phylogenetic relationships. Offered occasionally.

BIO 429 FISHERIES BIOLOGY 4, 3/3
Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213; Upper-division status. Ecology and management of fish populations. Sampling techniques and fisheries-management techniques (including stocking, hatcheries, and aquaculture programs). Feeding, behavior, and life history of fishes. Offered alternate years.

BIO 430 STREAM ECOLOGY 4, 3/3; CT14, IM14, WIIF
Prerequisites: BIO 111 (with a grade of C or Better), BIO 211, BIO 213 and BIO 333; Upper-division status. Biological, chemical, geomorphic, and hydrologic features affecting the ecology of flowing water systems. Emphasis on freshwater invertebrate life histories, adaptations, and community structure in shallow streams. Offered alternate years.
Equivalent Course: BIO 430W

BIO 431 AQUATIC ENTOMOLOGY 4, 3/1

BIO 433 ORNITHOLOGY 4, 3/3
Prerequisites: Prerequisites: BIO 111 (with a grade of C or Better), BIO 211 and BIO 213. Introduction to the study of birds including a survey of the diversity of avian behaviors, life history strategies, mating systems, ecology, and physiological-morphological specializations of flight. Offered occasionally.

BIO 440 APPLICATIONS IN BIOTECHNOLOGY 3, 3/0; CT14, IM14, WIIF
Prerequisites: BIO 111 (with a grade of C or Better), BIO 211, BIO 213, CHE 111 and CHE 112/114. Case-study exploration of molecular, cellular and immunological techniques used to address industrial, agricultural, environmental and human health issues. Emphasis on underlying biological principles, the biotechnology employed and evidence of effectiveness. Safety, policy issues, bioethical considerations and public perception will be discussed. Offered every fall semester.

BIO 450 RECOMBINANT DNA TECHNOLOGY 4, 2/4
Prerequisites: BIO 111 (grade of C or better), BIO 211, BIO 213, BIO 303, BIO 305, CHE 111, CHE112/114 and CHE 201. Extensive hands-on experience using the techniques of biotechnology. Emphasis on techniques involving the construction of recombinant DNA molecules and their analysis. Offered occasionally.

BIO 488 BIOLOGY INTERNSHIP 1-15, 0/0
Prerequisites: Minimum cumulative and biology GPA of 2.5; BIO 111, BIO 212, BIO 213, BIO 214; faculty adviser and department chair permission. An opportunity to apply learned principles and methodologies in a workplace setting. Offered every semester.
BIO 495 SPECIAL PROJECT
1-3, 0/0
Prerequisites: Faculty adviser and department chair permission. Offered every semester.

BIO 498 HONORS RESEARCH
1, 3, 0/0
Prerequisites: BIO 111, BIO 212, BIO 213, BIO 214; completion of 70 or more credit hours; minimum GPA of 3.4 in biology major and minimum cumulative GPA of 3.0. Independent investigation of an original scientific problem, completed over two semesters with transition to the second semester dependent upon satisfactory completion of research proposal during the first semester. Submission of a final written report of investigation and an oral presentation of work at a scientific meeting. Offered every semester.

BIO 499 INDEPENDENT STUDY
3-12, 0/0
Prerequisites: Faculty adviser and department chair permission. Offered every semester.