BIOL 1551 Anatomy and Physiology 1 3 s.h.
Structure, function, and clinical applications of the integument, musculature, skeletal, and nervous systems. Targeted for students in nursing and associated health professions. Three hours of lecture. Not applicable to the Biology major.
Prereq.: High school biology, CHEM 1501 or equivalent, and MATH 1501 or equivalent.
Gen Ed: Natural Science.

BIOL 1545 Allied Health Anatomy and Physiology 5 s.h.
Explores the structure and function of the human body and its organ systems. Diseases and their relationship to various physiological systems. Four hours lecture, two hours lab. Not applicable to the Biology major.
Prereq.: High school biology and chemistry, or equivalent.
Gen Ed: Natural Science.

BIOL 1545L Allied Health Anatomy and Physiology Laboratory 0 s.h.
Allied Health Anatomy and Physiology Laboratory.

BIOL 1551 Anatomy and Physiology 1 3 s.h.
Anatomical study of skeletal, muscular, and nervous systems. For students in nursing and associated health professions. Two hours of lecture per week. Not applicable to the Biology major. BIOL 1551 must be taken either previous or concurrent.
BIOL 1552 Anatomy and Physiology 2 4 s.h.
Structure, function, and clinical applications of the endocrine, cardiovascular, respiratory, renal, digestive, and reproductive systems. Targeted for students in nursing and associated health professions. Three hours lecture, two hours lab. Not applicable to the Biology major.
Prereq.: BIOL 1551.
Gen Ed: Natural Science.

BIOL 1552L Anatomy and Physiology 2 Laboratory 0 s.h.
Anatomy and Physiology 2 Laboratory.

BIOL 1560 Microbiology for the Health Professions 2 s.h.
Characteristics, epidemiology, and pathology of viruses, bacteria, and protozoa of medical significance. Other topics dealing with the control of microorganisms and food microbiology will be covered. Not applicable to a biology major. Two hours of lecture. Must be taken concurrent with BIOL 1560L or substitute.

BIOL 1560L Microbiology Laboratory for Health Professions 1 s.h.
Microscopy, cultivation, and identification of bacteria. Microbiology of foods. Disinfection techniques. Not applicable to a biology major. Three hours of laboratory per week. Must be taken concurrent with BIOL 1560.

BIOL 2601 General Biology: Molecules and Cells 4 s.h.
The chemical and physical foundations of life, structure and function of cells and organelles, metabolism, basic molecular biology and inheritance, and principles of evolution. Three hours of lecture, two hours of lab per week.
Prereq.: CHEM 1515 or concurrent enrollment in CHEM 1515.
Coreq.: BIOL 2601L.
Gen Ed: Natural Science.

BIOL 2601H Honors General Biology Molecules and Cells 4 s.h.
The chemical and physical foundations of life, structure and function of cells and organelles, metabolism, basic molecular biology and inheritance, and principles of evolution. Three hours of lecture, three hours of lab per week.
Prereq.: CHEM 1515 or concurrent enrollment in CHEM 1515.
Gen Ed: Natural Science.

BIOL 2601L General Biology: Molecules and Cells Laboratory 0 s.h.
General Biology: Molecules and Cells Laboratory.

BIOL 2602 General Biology: Organisms and Ecology 4 s.h.
The structure and function of plants and animals. Examination of the structure and functioning of organismic communities and ecosystems. Required of all biological sciences majors. Three hours of lecture, two hours of lab per week.
Prereq.: BIOL 2601 and CHEM 1515.
Gen Ed: Natural Science.

BIOL 2602H Honors General Biology Organisms and Ecology 4 s.h.
The structure and function of plants and animals. Examination of the structure and functioning of organismic communities and ecosystems. Required of all biological sciences majors. Three hours of lecture, three hours of lab per week.
Prereq.: BIOL 2601 and CHEM 1515.
Gen Ed: Natural Science.

BIOL 2602L General Biology: Organisms and Ecology Laboratory 0 s.h.
General Biology: Organisms and Ecology Laboratory.

BIOL 2603 Integrated Biology for BS/MD 4 s.h.
Prereq.: admittance to the BS/MD program, BaccMed program, BS in Biochemistry, or Electrical and Computer Engineering with a Biomedical emphasis.

BIOL 3702 Microbiology 4 s.h.
Fundamentals of the biology of microbes. The principles of microbial structure, function, reproduction, metabolism, genetics, phylogeny, host-parasite relationships, and immunity. Fundamental technical skills acquired through laboratory experiences. Three hours lecture, three hours laboratory.
Prereq.: BIOL 2601 or BIOL 2603 and concurrent enrollment in BIOL 3702L.

BIOL 3702H Honors Microbiology 4 s.h.
Fundamentals of the biology of microbes. The principles of microbial structure, function, reproduction, metabolism, genetics, phylogeny, host-parasite relationships, and immunity. Fundamental technical skills acquired through laboratory experiences. Three hours lecture, three hours laboratory.
Prereq.: BIOL 2601 or BIOL 2603 and concurrent enrollment in BIOL 3702L.

BIOL 3702L Microbiology Laboratory 0 s.h.
Microbiology Laboratory.

BIOL 3703 Clinical Immunology 3 s.h.
Fundamentals of immunology, including both humoral and cellular immunological responses. Applications of immunological methods in medical research and patient treatment.
Prereq.: BIOL 2601 or BIOL 2603 and BIOL 3702 recommended.

BIOL 3703L Clinical Immunology Laboratory 1 s.h.
VDRL, ASO, febrile, latex, pregnancy, and viral tests; flocculation, precipitation, complement fixation, and titration procedures for various diseases. Three hours lab per week. Identical with MLS 3703L and MLT 3703L.
Prereq.: BIOL 2602.
Concurrent with: BIOL 3703.

BIOL 3704 Biological Anthropology 3 s.h.
The physical origins and development of the human species as a member of the primate order and the biological bases of human differences disclosed by human paleontology and archaeology. Also listed with ANTH 3703.
Prereq.: ANTH 1500 and BIOL 2601.

BIOL 3705 Introduction to Human Gross Anatomy 4 s.h.
Overview of human structure, using a regional approach to examine the functional anatomy of the musculoskeletal, nervous, and visceral systems. Three hours lecture, two hours lab.
Prereq.: BIOL 2602 or BIOL 2603.

BIOL 3705L Introduction to Human Gross Anatomy Laboratory 0 s.h.
Introduction to Human Gross Anatomy Laboratory.

BIOL 3710 Mammalian Anatomy 3 s.h.
Composite study of the anatomical systems of mammals, based on the cat. One hour lecture, four hours lab.
Prereq.: BIOL 2602.

BIOL 3710L Mammalian Anatomy Laboratory 0 s.h.
Mammalian Anatomy Laboratory.

BIOL 3711 Cell Biology: Fine Structure 3 s.h.
Theoretical and conceptual background necessary for understanding cellular structure-function relationships. Basic architecture of the cell, various organelles. The basic behavior of cells analyzed illustrating the integrative interaction of organelle systems.
Prereq.: BIOL 2601 or BIOL 2603.

BIOL 3716 Molecular Microbiology 1: Nucleic Acids 4 s.h.
Isolation and characterization of DNA and RNA from microbes with an emphasis on cloning, sequencing, structural characterization, expression, and phylogenetic analysis. Two hours lecture, six hours laboratory.
Prereq.: BIOL 3702 and permission of the instructor.

BIOL 3717 Molecular Microbiology 2 4 s.h.
Protein Biology. Develops the analytical skills necessary to conduct molecular biology research in the area of protein analysis and proteomics. Two hours lecture and four hours laboratory per week.
Prereq.: BIOL 3702.

BIOL 3721 Genetics 3 s.h.
Genetic material, reproductive cycles, sex determination, mitosis, meiosis, mendelism, probability linkage, genes in populations, mutation, evolution.
Prereq.: BIOL 2601 or BIOL 2603.

BIOL 3725 Mammalogy 3 s.h.
Overview of structure, function, evolutionary history, behavior, ecology, and classification of mammals. Animal groups will be studied from diverse biological points of view. Three hours lecture.
Prereq.: BIOL 2601, BIOL 2602.
BIOL 3730  Human Physiology  4 s.h.
Concepts of human physiology that focus on the regulation of homeostatic mechanisms by the neural, endocrine, cardiovascular, respiratory, and renal systems. Four hours lecture.
Prereq.: BIOL 2602 or BIOL 2603.

BIOL 3730L  Human Physiology Laboratory  1 s.h.
Experimental approach to the study of human physiology that explores regulation of homeostasis by the neural, endocrine, cardiovascular, respiratory, and renal systems. Three hours laboratory.
Prereq. or concurrent: BIOL 3730.

BIOL 3740  Plant Diversity  4 s.h.
Examination of the diversity of plant species and their interaction with the environment; the morphology, reproduction and ecology of a wide variety of vascular and nonvascular plants. Three hours lecture, two hours lab.
Prereq.: BIOL 2602.

BIOL 3740L  Plant Diversity Laboratory  0 s.h.
Plant Diversity Laboratory.

BIOL 3741  Animal Diversity  4 s.h.
Examination of the diversity of animal species and their interaction with the environment; the morphology, reproduction and ecology of a wide variety of invertebrate and vertebrate phylon. Three hours lecture, two hours lab.
Prereq.: BIOL 2602.

BIOL 3741L  Animal Diversity Laboratory  0 s.h.
Animal Diversity Laboratory.

BIOL 3745  Plant Physiology  3 s.h.
Examination of the physiology of higher plants with emphasis on the whole plant aspects as well as on biochemical, cellular and molecular aspects of how plants function including transport and translocation of water and solutes, photosynthesis and respiration, growth and development.
Prereq.: BIOL 2601 and BIOL 2602 or instructor consent.

BIOL 3759  Evolution  3 s.h.
Examination of fundamental evolutionary mechanisms integral to such covered topics as natural selection, drift, genetic variance maintenance, gene flow consequences, phylogenetic resolution, modes of speciation, coevolution, cooperation and mating system structure. Ecological concepts will be integrated throughout.
Prereq.: BIOL 2601 and BIOL 2602 or instructor consent.

BIOL 3762  Field Botany  4 s.h.
Identification, ecology, and significance of local plants. Two hours lecture, four hours lab.
Prereq.: BIOL 2602.

BIOL 3762L  Field Botany Laboratory  0 s.h.
Field Botany Laboratory.

BIOL 3775  Comparative Vertebrate Anatomy  3 s.h.
Comparison of morphology of vertebrates, emphasizing evolutionary development of organ systems. Two hours lecture, three hours lab.
Prereq.: BIOL 2602.

BIOL 3775L  Comparative Vertebrate Anatomy Laboratory  0 s.h.
Comparative Vertebrate Anatomy Laboratory.

BIOL 3780  General Ecology  5 s.h.
Examination of ecological principles affecting species distributions, interactions and biodiversity; dynamics of populations, communities and ecosystems; life history evolution; origin, maintenance and loss of genetic variation; mechanisms of speciation and extinction; experimental design and analysis. Three hours lecture, four hours lab.
Prereq.: BIOL 2602.

BIOL 3780L  General Ecology Laboratory  0 s.h.
General Ecology Laboratory.

BIOL 3780  General Ecology  5 s.h.
Examination of ecological principles affecting species distributions, interactions and biodiversity; dynamics of populations, communities and ecosystems; life history evolution; origin, maintenance and loss of genetic variation; mechanisms of speciation and extinction; experimental design and analysis. Three hours lecture, four hours lab.
Prereq.: BIOL 2602.

BIOL 3780L  General Ecology Laboratory  0 s.h.
General Ecology Laboratory.
BIOL 4823  Cancer Biology  2 s.h.
This course will present the student with the comprehensive body of knowledge concerning cancer biology. It will draw upon all areas of biological sciences; from environmental causal factors to the molecular mechanisms underlying tumor cell formation and development of malignant tumors. The scientific basis of therapies will be explored.
Prereq.:  Junior standing.

BIOL 4829  Microbial Physiology  3 s.h.
This course synthesizes material covered in introductory microbiology and cell and molecular biology. Topics include biomolecule synthesis, molecular biology, bacterial genetics, gene expression, energy production photosynthesis, bacteriophages and microbial stress response.
Prereq.:  BIOL 3702 or BIOL 3711.

BIOL 4834  Advanced Physiology: Integrative Mechanisms  3 s.h.
Examination of advanced human physiology through a detailed study of selected body systems. Systems examined may include the cardiovascular, respiratory, and renal systems, exchange dynamics among body fluid compartments, and acid-base balance. Three hours lecture.
Prereq.:  BIOL 3730.

BIOL 4834L  Advanced Physiology: Integrative Mechanisms Laboratory  1 s.h.
Experimental approach to the examination of advanced human physiology through a detailed study of selected body systems. Systems examined may include cardiovascular, renal and respiratory systems, exchange dynamics among body fluid compartments, and acid-base balance. Three hours lab.
Prereq. or concurrent BIOL 4834.

BIOL 4835  Advanced Physiology: Regulatory Mechanisms  3 s.h.
Examination of advanced human physiology through a detailed study of selected body systems. Systems examined may include musculoskeletal, gastrointestinal, metabolic and thermoregulatory. Three hours lecture.
Prereq.:  BIOL 3730.

BIOL 4835L  Advanced Physiology: Regulatory Mechanisms Laboratory  1 s.h.
Experimental approach to the examination of advanced human physiology through a detailed study of selected body systems. Systems examined may include the musculoskeletal, gastrointestinal, metabolic and thermoregulatory. Three hours lab.
Prereq. or concurrent BIOL 4835.

BIOL 4837  Cell Biology: Protein Biology Laboratory  1 s.h.
The relationship of nucleic acid structure and protein structure will be studied in hands on series of laboratory experiments. Concepts presented will integrate the use of modern molecular biology techniques with contemporary approaches to current problems in biology. Three hours of laboratory.
Prereq.:  BIOL 3711 or consent of instructor.

BIOL 4839  Selected Topics in Physiology  1 s.h.
Advanced study of topics in physiology not covered in depth in other physiology courses. May be repeated twice up to 2 s.h.
Prereq.:  BIOL 3730.

BIOL 4848  Biology of Fungi  3 s.h.
Examination of fungal and fungal-like organisms with emphasis placed upon their taxonomy, phylogenetic relationships, structure, function, physiology, genetics, and ecology. Exploration of their role in agriculture, medicine, and scientific research.
Prereq.:  BIOL 2602 or graduate standing.

BIOL 4849  Medical Mycology  3 s.h.
Survey of infectious diseases caused by fungi including their etiology, epidemiology, histopathology, diagnosis, and treatment. Host-parasite interactions and the environmental and molecular factors that contribute to establishment of fungal disease in humans and animals.
Prereq.:  BIOL 2602.

BIOL 4850  Problems in Biology  1-3 s.h.
Special biological problems for which materials and equipment are available and for which the student is qualified.
Prereq.:  Senior standing or consent of the chairperson.

BIOL 4851  Senior Biology Capstone Experience  2 s.h.
A capstone experience for the major in Biological Sciences (B.A. or B.S. degree).
Prereq.:  Senior status in Biological Sciences, completion of at least one 3700 and 4800 level laboratory course.

BIOL 4861  Introduction to Biomedical Research  2 s.h.
The class will introduce students to processes and strategies at the core of modern biomedical research. Students will develop an understanding of experimental design, experimental implementation, data evaluation and communication.
Prereq.:  BIOL 3730.

BIOL 4866  Forest Ecology  4 s.h.
A study of the structure, function, and management/conservation of forest ecosystems, including the biology and taxonomy of woody plants. Major emphasis on eastern North America. Corequisite BIOL 4866L.
Prereq.:  20 s.h. BIOL or GEQ, or combination thereof, or II.

BIOL 4866L  Forest Ecology Laboratory  0 s.h.
Forest Ecology Laboratory.

BIOL 4867  Stem Cell Biology  3 s.h.
This course deals with the study of stem cells and their role in biology. Developmental aspects of stem cells will be presented. The relevance of stem cells to medicine and applied biology will be discussed.
Prereq.:  BIOL 3711 or BIOL 4890 or consent of instructor.

BIOL 4878  Conservation Biology  3 s.h.
A socioeconomic, political and ecological approach to issues associated with the maintenance and value of biodiversity and ecosystem services; consequences of anthropogenic climate change, fragmentation, overharvesting, extinction, and invasion of non-native species; biofuels; ecological restoration, nature reserve design and sustainability. Three hours lecture.
Prereq.:  BIOL 3759 or BIOL 3780 or permission of instructor.

BIOL 4882  Mathematical Biology Research  1-3 s.h.
Introduction to research in mathematical biology through an interdisciplinary study of a topic in biology and mathematics. May be repeated once. Grading is Traditional/PR. Listed also as MATH 4882.
Prereq.:  MATH 1571 or permission of instructor.

BIOL 4890  Molecular Genetics  3 s.h.
Examination of DNA structure, DNA replication, transcription, translation, RNA processing, and gene control in both prokaryotes and eukaryotes.
Prereq.:  BIOL 3711 or BIOL 3721.

BIOL 4890L  Molecular Genetics Laboratory  1 s.h.
Examination of DNA structure, DNA replication, transcription, translation, RNA processing, and gene control in both prokaryotes and eukaryotes.
Prereq.:  BIOL 3711 or BIOL 3721.

BIOL 4893  Biology of Proteins  2 s.h.
This course engages the student in the world of proteins, from the basic structure and function of proteins in biological systems, to the applied sciences involved in the development of commercially valuable proteins. This course extends the students previous understanding and expertise in molecular biology to emphasize proteins.
Prereq.:  BIOL 3711 or BIOL 4890 or consent of instructor.

BIOL 4896  Introduction to Biomedical Research  2 s.h.
The class will introduce students to processes and strategies at the core of modern biomedical research. Students will develop an understanding of experimental design, experimental implementation, data evaluation and communication.
Prereq.:  BIOL 3730.

BIOL 4897  Internship in Biomedical Research  3 s.h.
This course is designed for a student pursuing the Certificate in Biomedical Research. Students enrolled in this course will be assigned to a research project in collaboration with physicians from the Mercy Health system. This course will provide the student with a comprehensive clinical research experience.
Prereq.: Accepted into Certificate in Biomedical Research program; concurrent or previously taking BIOL 4896.
BIOL 4898 Research in Physiology 3 s.h.
A comprehensive laboratory experience under the supervision of a faculty mentor. Course may be repeated once for a total of 6 s.h.
Prereq.: BIOL 3730, CHEM 3720, and acceptance into the Certificate in Anatomy and Physiology program.

BIOL 4899 Internships in the Biological Sciences 2 s.h.
Internships integrate theory and practice through supervised learning experiences. Internships are available in any area of the biological/biomedical sciences, including field research and analytical, clinical, or research laboratories. Students submit a proposal of the internship, maintain a journal of experiences, and submit a final project paper.
Prereq.: Junior or senior standing in Biological Sciences and permission of the chairperson.

BIOL 5806 Field Ecology 4 s.h.
Field study involving quantitative methods for the collection, analysis, and interpretation of ecological data in populations and communities. Pre-field trip lectures, specified experiments, independent study, a written report, and an oral presentation of the independent study project. Required off-campus travel. Field conditions may be rigorous and/or primitive.
Prereq.: BIOL 3780.

BIOL 5811 Ornithology 4 s.h.
Structure, physiology, behavior, ecology, and evolution of birds. Natural history of common bird species and important bird groups, especially those in Ohio. Basic methods and skills for field study of birds. Three hours lecture, three hours lab.
Prereq.: BIOL 3741.

BIOL 5811L Ornithology Laboratory 0 s.h.
Omnitology Laboratory.

BIOL 5813 Vertebrate Histology 4 s.h.
The microscopic study of mammalian tissues and organs. Three hours lecture, two hours lab.
Prereq.: BIOL 3711 or BIOL 3730.

BIOL 5813L Vertebrate Histology Laboratory 0 s.h.
Vertebrate Histology Laboratory.

BIOL 5823 Advanced Eukaryotic Genetics 3 s.h.
Mechanisms and control of eukaryotic DNA replication, current advances in understanding the genetics basis of cancer and other genetic diseases, problems and benefits of the various eukaryotic genome projects (human and others), gene therapy and genetic engineering in animals and plants.
Prereq.: BIOL 3721 and BIOL 4890.

BIOL 5824 Behavioral Neuroscience 4 s.h.
Explores the biological basis of human experience and behavior. Topics include basic neuroanatomy and neuropharmacology, emotions, learning and memory, sleep and biological rhythms, reproductive behavior, and communication. Three hours lecture, three hours lab.
Prereq.: BIOL 3730.

BIOL 5824L Behavioral Neuroscience Laboratory 0 s.h.
Behavioral Neuroscience Laboratory.

BIOL 5827 Gene Manipulation 2 s.h.
Techniques of modern molecular biology including the use of restriction enzymes, plasmid and phage vectors, Southern blots and the polymerase chain reaction (PCR). Introduction and manipulation of foreign DNA in bacterial and eukaryotic systems. Six hours lab.
Prereq.: BIOL 4890.

BIOL 5832 Principles of Neurobiology 4 s.h.
Topics include cell and molecular biology of the neuron, properties of excitable membranes, functional neuroanatomy, integrated motor control, sensory signal transduction, developmental neurobiology, mechanisms of disease processes, and higher cortical function.
Prereq.: BIOL 3730.

BIOL 5833 Mammalian Endocrinology 3 s.h.
Detailed examination of the hormones of the hypothalamus, pituitary, thyroid, adrenal pancreas, gonads, and other organs with putative endocrine function. Focus on the physiological functions of hormones and their mechanisms of action with emphasis on the human.
Prereq.: BIOL 3730.

BIOL 5840 Advanced Microbiology 3 s.h.
Molecular mechanisms for virulence of pathogenic organisms.
Prereq.: BIOL 3702 or equivalent.

BIOL 5844 Physiology of Reproduction 3 s.h.
Current concepts of reproductive processes and their physiological control in mammalian systems.
Prereq.: BIOL 3730.

BIOL 5853 Biometry 3 s.h.
Application of fundamental theory and procedures to the statistical analysis of biological data.
Prereq.: 20 s.h. of Biological Sciences.

BIOL 5858 Computational Bioinformatics 3 s.h.
Project-based learning course with a focus on using a Linux environment and PERL for processing large genomic datasets and data mining. Relational database and BioPERL will also be introduced for genomic data analysis and display. Three hours of combined lecture and lab per week.

BIOL 5868 Gross Anatomy 1 4 s.h.
Regional study of the human body with emphasis on functional and topographic anatomy and clinical correlations. Two hours lecture-demonstration, four hours lab.
Prereq.: Admission to the YSU Physical Therapy program or permission of instructor.

BIOL 5868L Gross Anatomy 1 Laboratory 0 s.h.
Gross Anatomy 1 Laboratory.

BIOL 5869 Gross Anatomy 2 4 s.h.
Regional study of the human body with emphasis on functional and topographic anatomy and clinical correlations. Two hours lecture-demonstration, four hours lab.
Prereq.: BIOL 5868.

BIOL 5869L Gross Anatomy 2 Laboratory 0 s.h.
Gross Anatomy 2 Laboratory.

BIOL 5888 Environmental Biotechnology 4 s.h.
Lectures will cover the use of microbes for solving environmental problems. In the laboratory, teams of students will design and implement experiments in bioremediation. This course is intended for students in biology, environmental studies, chemistry, and engineering. Two hours lecture and four hours lab.
Prereq.: CHEM 3719 or CEEN 3736.

BIOL 5888L Environmental Biotechnology Laboratory 0 s.h.
Environmental Biotechnology Laboratory.