
Biology

Department of Biology and Environmental Science

Website: <http://www.marietta.edu/~biol/>

Chair: Dr. Peter E. Hogan (hoganp@marietta.edu)

Associate professors: Steven R. Spilatro, David G. McShaffrey, Almuth H. Tschunko; Assistant professor: David C. Brown; Lecturer: Tanya K. Jarrell

Secretary: Judith Dunn

Requirements for a major in Biochemistry: Biology 101, 105, 131, and three other courses in Biology selected from 202, 309, 330, 420, and 430; Chemistry 131-134, 231, 303 - 306, 420, and 422; Biology 490 and 491 or Chemistry 495 and/or 496; Mathematics 125; and Physics 211, 212. [Note: Students planning to attend graduate school in biochemistry are advised to take one semester of physical chemistry (Chemistry 331), an additional semester of calculus (Mathematics 126), and General Physics (Physics 221 and 222) instead of College Physics (Physics 211, 212). Biology 420 is recommended for students interested in graduate school or in working in a genetics laboratory].

General Biology **7 Hours**
 BIOL 101 BIOL 105 BIOL 131

Biology Electives: Any 3 of the following **10 to 12 Hours**
 BIOL 202 BIOL 309 BIOL 330
 BIOL 420 BIOL 430

Chemistry: **24 Hours**

CHEM 131,133 CHEM 132,134

CHEM 231 CHEM 303,305

CHEM 304,306 CHEM 420,422

Calculus **4 Hours**

MATH 125

Physics **8 Hours**

PHYS 211 PHYS 212

Senior Capstone: One of the following **3 Hours**

BIOL 490, 491

or

CHEM 495, 496, or both

Total **56 to 58 Hours**

Requirements for a major in Biology: 40 hours in Biology to include Biology 101, 102, 105, 106, and 131; Internship or Tutorship (Biology 497 or 498); Library Research I and II (Biology 480 and 481) or Biology Research I and II (Biology 490 and 491); one cellular course (Biology 309 or 330); one organ course (Biology 203 or 212); one organism course (Biology 220, 222, 311, or 312); one population course (Biology 318, 320, or 450); one plant course (Biology 311 or 312); one animal course (Biology 203, 212, 220, 222, or 320); one field course (Biology 220-221, 222-223, 311, 312, 318-319, or 450); one experimental course (Biology 309, 318 - 319, 320 - 322, or 420); and an additional selection of courses from Biology curriculum to total 40 hours of Biology; Chemistry 131 - 134, and Chemistry 303 and 305; one Computer Science course (105 or higher); and one Mathematics course (124 or higher) or one Statistics course (Psychology 285 or Math 123).

General Biology **12 Hours**
 BIOL 101 BIOL 102 BIOL 105
 BIOL 106 BIOL 131
 BIOL 497 or 498

Biology Distributions: Complete Each Division Requirement

Cellular: Either of the following **3 or 4 Hours**
 BIOL 309 BIOL 330

Organ: One of the following **3 or 4 Hours**
 BIOL 203 BIOL 212

Organism: One of the following **3 or 4 Hours**
 BIOL 220 BIOL 222 BIOL 311
 BIOL 312

Population: One of the following **3 or 4 Hours**
 BIOL 318 BIOL 320 BIOL 450

Plant: One of the following **4 Hours**
 BIOL 311 BIOL 312

Animal: One of the following **3 to 4 Hours**
 BIOL 203 BIOL 212 BIOL 220
 BIOL 222 BIOL 320

Field: One of the following **4 Hours**
 BIOL 220 & 221 BIOL 222 & 223
 BIOL 311 BIOL 312
 BIOL 318 & 319 BIOL 450

Experimental: One of the following **4 Hours**
 BIOL 309 BIOL 318 & 319
 BIOL 320 & 322 BIOL 420

Senior Capstone: Either option **2 to 3 Hours**
 Library Research Project:
 BIOL 480 BIOL 481
 or
 Research Project:
 BIOL 490 BIOL 491

Biology Electives: An additional selection of courses from Biology Curriculum to total 40 hours of Biology.

Chemistry **12 Hours**
 CHEM 131, 133 CHEM 132, 134
 CHEM 303, 305

Computer Science **3 Hours**
 CSCI 105 or Higher

Math or Statistics **3 or 4 Hours**
 PSYC 285 or MATH 123
 or MATH 124 or Higher

Total **59 Hours**

Requirements for a minor in Biology: Biology 101, 102, 105, 106, 131, and 11 hours of Biology electives.

BIOL101 Modern Biology

Lecture course introducing fundamental concepts in biology, including ecology, evolution, heredity and DNA, human reproduction, and some physiological concepts.

Prerequisites: Concurrent registration in Biology 105.

Credit: 3 Hours.

BIOL102 Environmental Biology

Lecture course in the applications of the scientific method, as developed in Biology 101 and 105, to the study of organisms, their physical environment, and the interactions of organisms and their environment. Topics of study include major world habitats and the environmental problems facing them, the diversity of life, and the principle of homeostasis.

Prerequisites: Biology 101 and concurrent registration in Biology 106 or Geology 101 and concurrent registration in Biology 111.

Credit: 3 Hours.

BIOL105 Modern Biology Laboratory

A laboratory course in which students apply the scientific method to a variety of experimental situations in biology. Although the experimental models may change from semester to semester, the lab exercises are designed to provide situations in which students can apply such techniques as critical thinking, application of the scientific method, observation, analysis of data, information retrieval, and communication of ideas. There will be periodic quizzes, homework assignments, and lab reports required.

Prerequisite: Concurrent registration in Biology 101.

Credit: 1 Hour.

BIOL106 Environmental Biology Laboratory

A laboratory course that builds on the skills developed in Biology 105. The experimental topics will differ from those of Biology 105, but will allow students to further develop such skills as using scientific method, critical thinking, and writing lab reports. There will be periodic quizzes, homework assignments, and lab reports required.

Prerequisite: Biology 105 and concurrent registration in Biology 102.

Credit: 1 Hour.

BIOL 111 Organisms and Environment

A laboratory course in which students apply the scientific method to a variety of topics in biology and environmental science. Students design and carry out experiments using various scientific tools and techniques, including computers and sensors to gather and analyze data. There will be a rigorous writing component, e.g. lab reports.

Prerequisite: Geology 101 and concurrent registration in Biology 102.

Credit: 1 Hour.

BIOL131 Introduction to Cellular and Molecular Biology

Fundamental topics in cellular and molecular biology, including chemistry of life, cell structure and function, cellular metabolism, cell reproduction, DNA, RNA, protein synthesis, and genetics.

Prerequisite: Biology 101.

Credit: 3 Hours.

BIOL202 General Microbiology

Survey of eukaryotic and prokaryotic microorganisms. Emphasizes structure and physiology of bacteria, and their roles as agents of disease, contaminants in food and water, and applications in modern biotechnology industries. Includes bacterial genetics, virology, and immunology. Laboratory exercises include cultivation and identification of bacteria, metabolism, food and water analysis, and virology.

Credit: 4 Hours.

BIOL203 Human Physiology

Lecture course in the physiology of humans. Topics include membrane physiology, control of cellular activity, digestion, metabolism and temperature regulation, nerve and muscle physiology, circulation, immunity, respiration, neurophysiology, and endocrinology.

Recommended prerequisite: Biology 212.

Credit: 3 Hours.

BIOL212 Human Anatomy

Lecture and laboratory course in gross anatomy of humans. Structures of major organ systems elucidated through lecture, use of A.D.A.M. software and anatomical models with possible occasional dissection of nonhuman cadavers and/or nonhuman cadaver parts.

Credit: 4 Hours.

BIOL220 Invertebrate Zoology

Exploration of 95 percent of animal species, from microscopic world of rotifers to the intricate colors of a butterfly's wing. Investigation of anatomy, taxonomy, ecology, and behavior of these fascinating organisms.

Credit: 3 Hours.

BIOL221 Invertebrate Zoology Laboratory

Local field trips to collect invertebrates for study. Laboratory identification and examination of collected material.

Prerequisite: Concurrent enrollment in Biology 220.

Credit: 1 Hour.

BIOL222 Vertebrate Zoology

The study of the behavioral and morphological adaptations of the vertebrates. We will also examine the taxonomy and ecology of vertebrate animals.

Credit: 3 Hours.

BIOL223 Vertebrate Zoology Laboratory

Field trips to observe native fish, amphibians, reptiles, birds and mammals. Laboratory identification and examination of collected material.

Prerequisite: Concurrent enrollment in Biology 222

Credit: 1 Hour.

BIOL285 Applied Nutrition

Chemical composition and importance of various foods as digested and absorbed by the body. Human energetics and nutrient requirements as critical components of balanced diet. Dietary planning for disease/disorder prevention and management, emphasize athlete nutrition. (Also listed as Sports Medicine 285.)

Prerequisite: Biology 101 or written permission of instructor.

Credit: 3 Hours.

BIOL309 Cell Biology

Examines the relationship between cell structure and function. An emphasis on membrane structure, cell transport, cytoskeleton, gene expression and regulation, cell division, and cellular causes of cancer. Laboratory exercises involve techniques used in the study of cell biology, including histology, spectrophotometry, cell fractionation, tissue culture, electrophoresis, and immunochemistry.

Prerequisites: Chemistry 131 - 134 and Biology 131.

Credit: 4 Hours.

BIOL311 Flowering Plants

Identification, uses, and ecological roles of trees, shrubs, and wildflowers are covered during field trips. Class covers plant structure, adaptations, classification, economically important plants and physiology.

Prerequisites: Biology 101 and 102, or written permission of instructor.

Credit: 4 Hours.

BIOL312 Lower Plants

Seaweeds, toadstools, and horsetails. Common yet overlooked organisms (including algae, mushrooms and other fungi, lichen, liverworts, mosses, horsetails, ferns, Ginkgo, and conifer trees) as well as spring wildflowers. Plant identification and ecological roles covered during field trips. Biology of each group and examples of economically useful or harmful members covered in class.

Prerequisites: Biology 101 and 102, or written permission of instructor.

Credit: 4 Hours.

BIOL318 Ecology

How animals and plants make their way in the world, ranging from struggle of individual organisms with their surroundings to interactions of populations and communities.

Prerequisite: Computer Science 105 or higher (CSCI 210 recommended).

Credit: 3 Hours.

BIOL319 Ecology Laboratory

Field-oriented investigations of local ecosystems designed to reinforce principles covered in Biology 318.

Prerequisites: Concurrent registration in Biology 318.

Credit: 1 Hour.

BIOL320 Animal Behavior

A lecture course dealing with the principle methods of animal behavior. Includes the history of animal behavior, "nature-nurture controversy," major behavioral concepts, nervous and endocrine control of behavior, development of behavior, and such specific behaviors as aggression, biological rhythms, communication, orientations, predator/prey relationships, and social behavior. Offered alternate years.

Prerequisite: Biology 101/102/105/106 recommended.

Credit: 3 Hours.

BIOL322 Animal Behavior Laboratory

Examination of basic invertebrate and vertebrate behaviors in a highly experimental framework. Offered alternate years.

Prerequisite: Concurrent enrollment in Biology 320.

Credit: 1 Hour.

BIOL325 Biology of Aging

Theories of the causes of aging. Cellular aging and major body systems are discussed in reference to normal functions and changes that occur in response to the aging process.

Prerequisite: Biology 101/105/203 recommended.

Credit: 3 Hours.

BIOL330 Genetics

Modern genetics including Mendelian and other patterns of inheritance, population genetics, genetic mapping, DNA and gene structure and function, genetic diseases, and introduction to genetic engineering.

Prerequisite: Biology 131.

Credit: 3 Hours.

BIOL401 Advanced Human Anatomy

Detailed study of musculo-skeletal system, joint structures, and special nerves. Other organ systems may be viewed. Human cadaver utilized for laboratory component. Includes demonstration dissections. (Also listed as Sports Medicine 401.)

Prerequisites: Biology 212; junior or senior standing; and written permission of instructor.

Credit: 2 Hours.

BIOL420 Biotechnology

Fundamentals and application of molecular genetics and genetic engineering. In-depth look at recombinant DNA, gene structure and expression, mutations, mobile elements, and viruses as they apply to biotechnology in agriculture, industry, and medicine. Laboratory covers fundamental techniques of molecular genetics. Offered alternate years.

Prerequisites: Biology 131; and Chemistry 131-4.

Recommended prerequisite: Biology 330.

Credit: 4 Hours.

BIOL430 Immunology

Functions and mechanisms of immune system, including major histocompatibility complex and humoral, cell-mediated and complement immune responses. Disease resistance, immunization, organ transplant rejection, autoimmune diseases, cancer immunology, and AIDS.

Prerequisites: Biology 131 and Chemistry 131-4.

Recommended prerequisite: Biology 309.

Credit: 3 Hours.

BIOL450 Aquatic Biology

Aquatic organisms and ecosystems, ranging from freshwater to oceans. Physics of life in water, water chemistry, and survey of aquatic habitats. Laboratory investigates these topics in local freshwater systems. Offered spring semester, alternate years.

Prerequisite: Biology 318. Recommended prerequisites: One or more of Biology 220, 222, and 312.

Credit: 4 Hours.

BIOL480 Biology Library Research I

Students pursue library research on a topic agreed upon between the student and the faculty in the Biology Department. This endeavor enables students to apply their knowledge of biology in a theoretical manner to a specific area of biology. Culmination of this experience is in Biology 481. (Either this course or Biology 490 is required of all senior biology majors).

Prerequisites: Biology major and Senior status.

Credit: 1 Hour.

BIOL481 Biology Library Research II

The library research done in Biology 480 is written in scientific form and presented in a formal seminar in the Biology Department. (Either this course or Biology 491 is required of all Senior biology majors.)

Prerequisite: Biology 480 or written permission of the chair of the Biology Department.

Credit: 1 Hour.

BIOL490 Biology Research I

Students pursue an “original,” hands-on, laboratory, and/or field research project in biology. This endeavor enables students to apply their knowledge of biology to an actual research project through application of the scientific method. This endeavor also requires the student to do an extensive review of the relevant literature. Culmination of this experience is in Biology 491. (Either this course or Biology 480 is required of all Senior biology majors.)

Prerequisites: Biology or Biochemistry major and Senior status.

Credit: 1 Hour.

BIOL491 Biology Research II

Hands-on research done in Biology 490 is written in scientific form (although actual publication is not required) or presentation at a poster session, and presentation of research results will be made in a formal seminar in the Biology Department. (Either this course or Biology 481 is required of all Senior biology majors.)

Prerequisite: Biology 490.

Credit: 2 Hours.

BIOL495 Directed Research

Instructor-directed student research; research area determined in consultation between student and instructor.

Prerequisite: Junior or Senior standing, or written permission of instructor.

Credit: 1 or more Hours.

BIOL497 Internship

Internships provide credit for educational value of certain work experiences. Such internships are worked out on an individual basis.

Prerequisite: Junior or Senior standing.

Credit: 1 to 3 Hours.

BIOL498 Tutorship

Tutorships provide credit to students who learn by helping other students to learn. Usually achieved by assisting in Biology Department laboratory.

Prerequisite: Junior or senior standing.

Credit: 1 Hour.