

# BIOLOGY (BIO)

## Course Descriptions

### **BIO 100. Introduction to Life Science Laboratory Skills. 3 Credit Hours.**

Introduction to Life Science Laboratory Skills is part of the Certificate of Specialization in Life Science Laboratory Assistant program. Students will practice basic lab skills in a research laboratory setting. Pipetting, solution preparation, media preparation, dilutions, sterile technique, separation methods, lab math, quality control, documentation, and other appropriate skills are taught with an emphasis on standard lab instrumentation, calibration or verification, and maintenance.

Prerequisites: Placement into MTH 140 or higher or completion of MTH 140S with a minimum grade of "C", and Reading Proficiency

### **BIO 103. Anatomy for Funeral Service. 3 Credit Hours.**

Anatomy for Funeral Service is a fundamental course on human anatomy. Emphasis will be on the integumentary, skeletal, muscular, nervous, cardiovascular, digestive, urinary, respiratory, and reproductive systems. This course is for students in the Funeral Service Education program and cannot be substituted for BIO 207, BIO 208, or BIO 215.

Prerequisites: BIO 111 with a minimum grade of "C" and Reading Proficiency

### **BIO 104. Basic Laboratory Methods for Biotechnology. 3 Credit Hours.**

Basic Laboratory Methods for Biotechnology introduces laboratory skills necessary to enter the field. Topics and techniques include safety, sterile technique, laboratory math, quality systems, documentation, collection of data, metrology, filtration, solution preparation, molecular biology techniques, and other laboratory techniques.

Prerequisites: Placement into MTH 140 or higher or completion of MTH 140S with a minimum grade of "C", and Reading Proficiency

### **BIO 106. Human Heredity (MOTR LIFS 100LG). 4 Credit Hours.**

Human Heredity will introduce students to basic concepts in human inheritance. Areas of emphasis will include patterns of inheritance, population genetics, the genetics of immunity and cancer, genetic engineering, gene therapy, and reproductive technologies.

Prerequisites: Reading Proficiency

### **BIO 109. Human Biology (MOTR LIFS 100). 3 Credit Hours.**

Human Biology is an introduction to basic human structure and function, as well as the human body's interaction with its surroundings, including cell theory, genetics, systems biology, ecology, and evolution.

Prerequisites: Reading Proficiency or concurrent enrollment in RDG 079

### **BIO 110. General Zoology (MOTR BIOL 100LZ). 4 Credit Hours.**

General Zoology provides a survey of the animal kingdom with emphasis on comparative anatomy, physiology, ecology, and evolution of the major invertebrate and vertebrate groups.

Prerequisites: Reading Proficiency

### **BIO 111. Introductory Biology I (MOTR BIOL 100L). 4 Credit Hours.**

Introductory Biology I provides a consideration of the principles of biology, with emphasis on the molecular approach to the structure and function of living organisms. This course is intended for liberal arts students and majors in physical and occupational therapy, nursing, and health science programs.

Prerequisites: Reading Proficiency or concurrent enrollment in RDG 079

### **BIO 113. Modern Aspects of Biology (MOTR BIOL 100). 3 Credit Hours.**

Modern Aspects of Biology provides a consideration of the principles of biology as they relate to socially relevant issues in nutrition, reproduction, sexuality, heredity, and disease.

Prerequisites: Reading Proficiency

### **BIO 117. Conservation and Ecology (MOTR BIOL 100EC). 3 Credit Hours.**

Conservation and Ecology focuses on the environment and the effects that humans have on the Earth. Interrelationships of living things to their environment and to each other are discussed with focus on the impact of humans on the environment, use and abuse of renewable and non-renewable natural resources, and conservation and restoration efforts.

Prerequisites: Reading Proficiency

### **BIO 119. Field Botany. 4 Credit Hours.**

Field Botany focuses on plant identification of native and naturalized grasses, forbs, and woody plants, with emphasis on flowering plants. The comparative morphology, systematics, evolution, and ecological factors that affect plant diversity and distribution, and the impact of humans on regional ecosystems are also explored. Off-campus field trips are required.

Prerequisites: Reading Proficiency

### **BIO 120. Field Zoology. 3 Credit Hours.**

Field Zoology introduces students to the natural history of animals within a wide variety of habitats. Topics will include the conservation, and history of wildlife populations in the Midwest, including insects and other invertebrates, fish, amphibians, reptiles, birds, and mammals. Techniques for collection, preservation, and identification will be covered. Off-campus field trips are required.

Prerequisites: Reading Proficiency

### **BIO 123. Animal Behavior. 3 Credit Hours.**

This course is an introductory course in invertebrate and vertebrate animal behavior. Emphasis will be placed on biological clocks, migrational patterns, reproductive strategies and hormones. The reoccurring theme will be the role of genetics and evolution in driving behavior.

Prerequisites: Reading Proficiency

### **BIO 124. General Botany I (MOTR BIOL 100LB). 4 Credit Hours.**

General Botany I will introduce students to the biological aspects of plant life, including cell structure and function, anatomy, morphology, physiology, genetics, taxonomy, and the environmental factors that affect plant growth. The laboratory reinforces the topics and concepts covered in the lecture.

Prerequisites: Reading Proficiency

### **BIO 140. Principles of Biology I (MOTR BIOL 150L). 5 Credit Hours.**

Principles of Biology I presents an introduction to scientific methodology and biological principles applied to the molecular level of the structure and function of living organisms. This course is intended for pre-medicine, pre-dentistry, pharmacy, biology, and other science majors.

Prerequisites: MTH 140 or MTH 140S or MTH 160S with a minimum grade of "C" or placement into MTH 160, and Reading Proficiency

### **BIO 141. Principles of Biology II. 4 Credit Hours.**

Principles of Biology II presents an introduction to scientific methodology and biological principles applied to the organism and supraorganism levels of biology. Topics covered include: population biology, evolution, and a survey of the major Domains and Kingdoms of living organisms. This course is intended for pre-medicine, pre-dentistry, biology, and other science majors.

Prerequisites: BIO 140 with a minimum grade of "C" and Reading Proficiency

### **BIO 148. Ozark Ecology. 3 Credit Hours.**

Ozark Ecology introduces students to one of the most biologically diverse ecosystems in the Midwest. It focuses on the interaction of plants and animals within unique Ozark natural communities such as oak-hickory forests, glades, bluffs, caves, springs, and streams. Management and land use practices affecting this ecosystem are reviewed.

Prerequisites: Reading Proficiency

**BIO 151. Biology of Human Health and Disease (MOTR LIFS 100D). 3 Credit Hours.**

Biology of Human Health and Disease will explore the evolution of microbes and human disease and the influences that regular exercise, diet, and genetic factors have on everyday good health. The course will also explore mechanisms, manifestations, and prevention of common diseases, such as heart disease and cancer.

Prerequisites: Reading Proficiency

**BIO 152. Quantitative Methods in Biotechnology. 2 Credit Hours.**

Quantitative Methods in Biotechnology introduces students in common calculations encountered in a cellular-molecular research setting.

Prerequisites: Placement into MTH 140 or completion of MTH 140S with a minimum grade of "C" or better, CHM 101 with a minimum grade of "C" or one year of high school chemistry, and Reading Proficiency

**BIO 154. The Biology of Human Sex (MOTR LIFS 100R). 3 Credit Hours.**

The Biology of Human Sex covers male and female reproductive systems, sexual gender, sexually transmitted infections, contraception, assisted reproductive techniques and the development of the fetus. This course will also cover typical and atypical behaviors of sexuality.

Prerequisites: Reading Proficiency

**BIO 157. Good Laboratory Practices, Compliance, and Bioinformatic Principles. 3 Credit Hours.**

Good Laboratory Practices, Compliance, and Bioinformatic Principles provides a general overview of the Food and Drug Administration (FDA) regulations as they pertain to the biotechnology field. Knowledge of current Good Laboratory Practices (cGLP) and current Good Manufacturing Practices (cGMP) is needed to work in biotechnology manufacturing and preclinical research laboratories. The course will emphasize practices of cGLP and cGMP that pertain to the biopharmaceutical industry as well as current standard operating procedures in Compliance, Bioinformatics, and Electronic Notebook usage.

Prerequisites: BIO 104 or BIO 111 or BIO 124 or BIO 140 or BIO 207 or BIO 225 with a minimum grade of "C", and Reading Proficiency  
Recommended Preparation: Basic computer skills

**BIO 177. Food Science. 3 Credit Hours.**

Food Science introduces the fundamental biological, chemical, and physical scientific principles associated with the study of foods. Topics include food composition and nutrition, food additives, regulations, food safety, toxicology, food preservation, packaging, food biotechnology, product development, and sensory evaluation.

Prerequisites: Reading Proficiency

**BIO 178. Food Science Laboratory. 1 Credit Hour.**

Food Science Laboratory provides a hands-on experience with equipment and technology for the culinary and dietetic student. The laboratory course will apply concepts learned from a Food Science lecture to a culinary or dietetic based lab experiences.

Prerequisites: Concurrent or prior enrollment in BIO 177 with a minimum grade of "C", and Reading Proficiency

**BIO 180. Practical Molecular Biology Laboratory Techniques. 1 Credit Hour.**

Practical Molecular Biology Laboratory Techniques is designed to provide an accelerated pathway to develop the skill sets necessary for students with a natural science degree to succeed in the Certificate of Specialization Biotechnology Program. Students will learn traditional molecular biology techniques including but not limited to micropipetting, gel electrophoresis, polymerase chain reaction, and spectroscopic applications.

Prerequisites: Permission from the Program Coordinator and Reading Proficiency

**BIO 203. General Microbiology I. 4 Credit Hours.**

General Microbiology I will introduce students to the study of microorganisms, including bacteria, viruses, and fungi with emphasis on morphology, culture techniques, and biochemical activity. The course will focus on human diseases specifically pathogens, infections, and resistance. The laboratory experience will supplement lecture concepts and provide students with skills in microscopy, aseptic technique, and identification of microorganisms.

Prerequisites: BIO 111 or BIO 140 with a minimum grade of "C", or college-level course equivalent, and Reading Proficiency

**BIO 207. Anatomy and Physiology I (MOTR LIFS 150LAP). 4 Credit Hours.**

Anatomy and Physiology I is the study of inter-relationships between the structure and the function at gross and microscopic levels of the organization of the living body. This course will use body systems to emphasize the anatomical terminology, cellular, and tissue level of organization. Anatomy and Physiology I includes the integumentary, skeletal, muscular, nervous, special senses and endocrine system. The laboratory component reinforces topics and concepts covered in lectures.

Prerequisites: BIO 111 or BIO 140 or CHM 101 with a minimum grade of "C", or college-level course equivalent, and Reading Proficiency

**BIO 208. Anatomy and Physiology II. 4 Credit Hours.**

Anatomy and Physiology II is a continuation of Anatomy and Physiology I, emphasizing the integrative functions of the cardiovascular (blood, blood vessels, and heart), lymphatic, digestive, respiratory, urinary, and reproductive systems. Additional focus will be on nutrition, metabolism, buffer systems, fluids and electrolytes, and acid-base balance.

Prerequisites: BIO 207 with a minimum grade of "C" and Reading Proficiency

**BIO 209. Kinesiology Fundamentals. 3 Credit Hours.**

Kinesiology Fundamentals is the study of human movement. It involves applying the anatomy of the musculo-skeletal system to functional movement as a basis to understanding of exercise. Additional lab hours required. (Credit is only allowed for either BIO 209 or PTA 222 or PTA 110.)

Prerequisites: BIO 207 with a minimum grade of "C" and Reading Proficiency

**BIO 215. Human Body Systems. 5 Credit Hours.**

Human Body Systems is a study of the structure and function of the normal, healthy human body. Emphasis will be on the organ systems as they relate to health information management and medical coding and billing. Additional focus will be on the use of anatomical language in the medical and scientific field, pharmacology and its effects on the human body, and diseases/conditions as it relates to the human body. This course is specifically for students in Health Information Management programs and cannot be substituted for BIO 207 or BIO 208.

Prerequisites: Reading Proficiency

**BIO 218. Microbiology for Biotechnology. 4 Credit Hours.**

Microbiology for Biotechnology provides a detailed exposure to structure, metabolism, genetics, and growth characteristics of microorganisms and viruses as well as the role they play in disease, ecological, and industrial applications. The structure and function of the immune system will also be covered.

Prerequisites: BIO 140 with a minimum grade of "C", CHM 105 with a minimum grade of "C", and Reading Proficiency

**BIO 219. Biotechnology I. 5 Credit Hours.**

Biotechnology I introduces basic biotechnology skills in preparation for Biotechnology II. Topics and techniques may include safety, current Good Manufacturing Practices (cGMP), agarose gel electrophoresis, plasmid construction, polyacrylamide gel electrophoresis (PAGE), polymerase chain reaction (PCR), mammalian cell culture, rapid plant genotyping, and other molecular research techniques.

Prerequisites: BIO 104 with a minimum grade of "C" or concurrent or prior enrollment in BIO 180 with a minimum grade of "C", BIO 140 with a minimum grade of "C", and Reading Proficiency

**BIO 220. Biotechnology II. 5 Credit Hours.**

Biotechnology II is a project-oriented course applying the fundamental DNA and protein manipulation techniques that are commonly used in biotechnology/bioengineering research laboratories in academia and industry.

Prerequisites: BIO 219 with a minimum grade of "C" and Reading Proficiency

**BIO 221. Workplace Learning: Biotechnology. 3-6 Credit Hours.**

Workplace Learning: Biotechnology provides the student the opportunity to apply theory and skills learned in the classroom, learn new skills, and explore career possibilities while supervised by a professional in the field and a faculty member. Students will observe and participate in the functions of the industry to enhance their preparation for entering the field. Minimum of 50 hours per credit hour in the workplace throughout the term.

Prerequisites: Concurrent or prior enrollment in BIO 220 with a minimum grade of "C" and Reading Proficiency

**BIO 223. Research Techniques in Biology. 1-3 Credit Hours.**

Research Techniques in Biology allows students to participate in research projects with a faculty mentor. Topics will be coordinated with the instructor. Students will learn how to research the scientific literature, develop experiments, collect and analyze data, and communicate results. Students must be advised by a faculty member (no self-advising). Contact the instructor for current research project information.

Prerequisites: BIO 111 with a minimum grade of "C" or BIO 140 with a minimum grade of "C", or BIO 124 with a minimum grade of "C", and Reading Proficiency

**BIO 225. Genetics. 3 Credit Hours.**

Genetics explores the fundamental principles of heredity in prokaryotic and eukaryotic organisms as well as the methods of genetic analyses at the molecular level. Topics include transmission genetics, molecular genetics, evolutionary genetics, and advances in biotechnology and genomics. (Credit is only allowed for either BIO 225 or BIO 559.)

Prerequisites: BIO 140 with a minimum grade of "C" and Reading Proficiency

**BIO 226. Advanced Topics in Biotechnology. 3 Credit Hours.**

Advanced Topics in Biotechnology focuses on current techniques used in biotechnology research and industry. Topics can include but are not limited to, techniques from biomedical, pharmaceutical, agricultural, environmental, microbiological, bioprocessing, biocomputing, and/or bioethical aspects of biotechnology.

Prerequisites: Concurrent or prior enrollment in BIO 219 with a minimum grade of "C" and Reading Proficiency

**BIO 228. Research and Presentation Skills for the Life Sciences. 2 Credit Hours.**

Research and Presentation Skills for the Life Sciences provides hands-on training, organizing, and presenting scientific data in document, poster, and oral formats. Students will write cover letters and resumes. Students will write written reports and create posters summarizing data generated in BIO 220 or from internships. This data will also be presented in poster format with corresponding oral presentations to various audiences. Mock employment interviews will also be conducted.

Prerequisites: Entry into this course must be approved by the program coordinator, and Reading Proficiency

Corequisites: BIO 220

**BIO 230. Ecology. 3 Credit Hours.**

Ecology explores the factors that determine the distribution and abundance of organisms in the natural world. Emphasis of study will focus on interactions at many levels including: organismal, population, community, ecosystem, and biosphere. In addition, human impacts upon ecological systems such as climate change and habitat fragmentation will be covered.

Prerequisites: BIO 141 with a minimum grade of "C" and Reading Proficiency

**BIO 231. Cell Biology. 3 Credit Hours.**

Cell Biology is a comprehensive course that integrates cellular structure and function at the molecular level. Emphasis will be on extracellular and intracellular signaling and cellular response to those signals. Other mechanisms of focus will be transcription, cytoskeleton, cell division, protein biology, organelles, cell trafficking, and signal transduction.

Prerequisites: BIO 140 with a minimum grade of "C" and Reading Proficiency

**BIO 232. Cell Biology Laboratory. 1 Credit Hour.**

Cell Biology Laboratory provides a hands-on experience with equipment and technology for molecular and cell biology research. The laboratory course will apply concepts learned from an Introduction to Cell Biology lecture to molecular based research project(s).

Prerequisites: BIO 140 with a minimum grade of "C" and Reading Proficiency

Corequisites: BIO 231

**BIO 233. Evolution. 3 Credit Hours.**

Evolution presents a broad overview of evolutionary biology, from its historical origins to its modern applications. Students will explore current theories about earth's evolutionary history, explain major biotic and abiotic process that drive evolution, and discuss the future of evolution in a world increasingly shaped by human activities.

Prerequisites: BIO 141 with a minimum grade of "C" and Reading Proficiency

**BIO 235. Genetics Laboratory. 2 Credit Hours.**

Genetics Laboratory provides a hands-on experience with equipment and technology for molecular and genetic research. The laboratory course will apply concepts learned from a Genetics lecture to research projects based on molecular and genetic technologies.

Prerequisites: BIO 140 with a minimum grade of "C", concurrent or prior enrollment in BIO 225 with a minimum grade of "C", and Reading Proficiency

**BIO 240. Environmental Science. 3 Credit Hours.**

Environmental Science integrates biological, chemical, and physical processes to examine changes in ecosystems and the impact of humans on the environment. Emphasis of study includes ecology, biodiversity, pollution, climate change, and sustainability. Analysis of environmental issues, policy, and strategies to reduce impacts to the environment will also be investigated.

Prerequisites: Reading Proficiency