

BIOLOGY (BIO)

BIO 100 First-Year Biology Experience Credits: 2

Typically Offered: Fall, Spring.

Course Description: Transitioning to a University-level Biology program, both academically and personally, requires a wide variety of skills. This course aims to foster a sense of belonging, promote engagement in the Biology program, and articulate expectations of the Biology program and its faculty. It also aims to help students develop and apply skills critical to their success including communication, information literacy, and accessing and understanding primary literature. Students will explore careers and postgraduate education available through the biology program, and the preparation necessary to successfully apply and succeed in those areas. It also introduces students to faculty research and research facilities at the University, providing an early opportunity to engage with the culture and scholarship of the Biology department.

BIO 101 Principles of Biology Credits: 4

Typically Offered: Fall, Spring.

Course Description: Introductory course on the principles of living phenomena intended for students not majoring in biology. Three hours lecture, two hours lab.

CORE 42: MOTR BIOL 100L; Essentials in Biology with Lab (attributes MO32, MLAB)



BIO 105 Principles of Organismal Biology Credits: 4

Typically Offered: Fall, Spring.

Course Description: Examines basic concepts and principles of evolutionary biology, behavior, ecology, physiology and morphology at the organismal level. Three hours lecture, three hours lab per week.

Prerequisite(s): ACT math score of 22 or higher or a score of 70 or higher on the MWSU Math Placement Exam or completion of MAT 110, MAT 110E, MAT 111, MAT 111E or MAT 116 with a grade of C or higher.

CORE 42: MOTR BIOL 150LOR; Biology w/Lab (attributes MO32, MLAB)



BIO 106 Principles of Cell Biology Credits: 4

Typically Offered: Fall, Spring.

Course Description: This introductory biology course examines the structure and function of animal and plant cells, interactions between cells, intra- and intercellular signaling mechanisms and basic cellular biochemistry. Within the above context, students are also introduced to basic concepts of molecular biology and development. Three hours lecture, three hours lab. **Prerequisite(s):** ACT math score of 22 or higher or a score of 70 or higher on the MWSU Math Placement Exam or completion of MAT 110, MAT 110E, MAT 111, MAT 111E or MAT 116 with a grade of C or higher.

CORE 42: MOTR BIOL 150LCB; Biology with Lab (attributes MO32, MLAB)



BIO 205 Genetics Credits: 4

Typically Offered: Fall, Spring.

Course Description: Explore and study classical, molecular, and evolutionary genetics. Three hours lecture and three hours lab per week.

Prerequisite(s): BIO 106 and CHE 111 with a grade of C or higher.

BIO 207 Human Ecology Credits: 3

Typically Offered: Fall.

Course Description: Environmental Science/Studies course analyzing how human society interacts with the natural world. **Prerequisite(s):** A grade of C or higher in either BIO 101, BIO 105 or BIO 106.

BIO 209 Introduction to Wildlife Conservation Credits: 3

Typically Offered: Spring.

Course Description: This course surveys the historic and modern development of conservation biology. How the principles of conservation are applied to the management, restoration, and preservation of wildlife natural resources is emphasized. **Prerequisite(s):** A grade of C or higher in BIO 105 or BIO 106. BIO 225 recommended.

BIO 220 Field Natural History Credits: 1-3

Typically Offered: Departmental Discretion.

Course Description: Involves participation in an off-campus field trip to experience a focused study of a unique biotic habitat. May involve pre-trip lectures and organizational meetings and/or post-trip class sessions or presentations. Different BIO 220 courses may be repeated for credit.

Prerequisite(s): BIO 101, BIO 105, or BIO 106 or departmental approval.

BIO 225 Ecology Credits: 4

Typically Offered: Fall, Spring.

Course Description: Covers principles of ecology and evolution, including field and research methods. Three hours lecture, three hours lab.

Prerequisite(s): A grade of C or higher in BIO 105.

BIO 250 Anatomy and Physiology Credits: 5

Typically Offered: Fall, Spring, Summer.

Course Description: Concepts of human structure and function and relationships of these concepts to cells, tissues, organs and systems. Four hours lecture, two hours lab. **Prerequisite(s):** A grade of C or higher in either BIO 101 or BIO 106.

CORE 42: MOTR LIFS 150LAP; Human Biology with Lab (attributes MO36, MLAB)



BIO 251 Medical and Public Health Microbiology Credits: 4

Typically Offered: Fall, Spring.

Course Description: Medically significant microorganisms, their characteristics, relationship to disease, transmission, and control methods. Three hours lecture, three hours lab. **Prerequisite(s):** BIO 101 or BIO 106 and CHE 101 or CHE 111 each with a grade of C or higher.

BIO 283 Introduction to Research Methods in Biology Credits: 1-5

Typically Offered: Departmental Discretion.

Course Description: Introduction to basic research in biology. Individual and team projects involving methods for solving biology-related research problems. **Prerequisite(s):** Departmental approval.

BIO 307 Plant Morphology Credits: 4

Typically Offered: Fall.

Course Description: This course discusses the morphological and anatomical features of plants within the context of their function, development, evolution, and diversity. Emphasis is also placed on surveying mechanisms affecting morphological and anatomical diversification. Laboratory and field investigations focus on modern techniques used in comparative plant morphology-, anatomy- and development investigations. Three hours lecture, three hours lab.

Prerequisite(s): A grade of C or higher in BIO 105.

BIO 308 History and Philosophy of the Natural Sciences Credits: 3
Typically Offered: Spring.

Course Description: A study of the history of the natural sciences with an emphasis on the philosophical analysis of these events. Same as CHE 308 and PHL 308. **Prerequisite(s):** Completion of General Studies Mathematics and Natural Sciences requirements.

BIO 310 Molecular Cell Biology Credits: 4

Typically Offered: Fall.

Course Description: Advanced cell biology covering topics relevant to cellular structure and function. Selected topics may include: cell signaling, cell adhesion, membrane function, cell motility and cytoskeletal structure and function. The cellular basis for some human syndromes and disease will also be covered. Three hours lecture, three hours lab.

Prerequisite(s): BIO 205 with a grade of C or higher.

BIO 311 Animal Physiology Credits: 4

Typically Offered: Fall.

Course Description: The physiological systems, their functions and interactions in animal physiology with emphasis on the human animal. Three hours lecture, three hours lab. **Prerequisite(s):** BIO 205 with a grade of C or higher.

BIO 314 Technology and Society Credits: 3

Typically Offered: Departmental Discretion.

Course Description: Participatory course emphasizing a particular problem and/or issue related to technology and society. Class participants will investigate the semester's theme using currently available technologies. Same as ENG 314, HUM 314, PSY 314, and PSC 314.

BIO 318 Ornithology Credits: 4

Typically Offered: Spring.

Course Description: Biology of birds covering avian taxonomy, anatomy, physiology, behavior, evolution, and both sight and sound identification.

Prerequisite(s): BIO 225 with a grade of C or higher.

BIO 325 Introduction to Paleontology Credits: 4

Typically Offered: Spring (even-numbered years).

Course Description: This class reviews the history of life on Earth, and the principles of quantitative and qualitative techniques used in paleontology. Three hours lecture, three hours lab. **Prerequisite(s):** BIO 101 or BIO 105 or ESC 111 with a grade of C or higher, or consent of the instructor.

BIO 349 Plant Systematics and Applications Credits: 4

Typically Offered: Spring.

Course Description: Gain an in-depth knowledge and hands on experience in the taxonomy, ecology, natural history, phylogenetics, and biogeography of plant groups crucial to humans and other animals, including crops and medicinal plants, as well as native plants of Northwest Missouri. Three hours lecture and three hours lab. A plant collection and field trips, including one weekend field trip are required.

Prerequisite(s): A grade of C or higher in BIO 307.

BIO 353 Philosophy of Biology Credits: 3

Typically Offered: Departmental Discretion.

Course Description: An introduction to current issues in the philosophy of biology such as the nature of biological organization, classification, and living systems and some of the problems that have arisen in the attempt to understand these complex systems. Same as PHL 353.

Prerequisite(s): BIO 101 or BIO 105 or BIO 106.

BIO 357 Ichthyology Credits: 4

Typically Offered: Departmental Discretion.

Course Description: The study of fishes, including morphology, physiology, taxonomy, phylogeny, evolution, ecology and behavior. Labs will cover field and laboratory techniques for studying fishes, including identification of families and species with an emphasis on the fishes of Missouri. Three hours lecture and three hours lab. One weekend field trip is required. **Prerequisite(s):** A grade of C or higher in BIO 106 and BIO 225.

BIO 360 Development of Federal Wildlife Law Credits: 3

Typically Offered: Fall (even-numbered years), Summer (online on demand).

Course Description: Introduction to the principles of federal wildlife law as currently practiced in the United States. The course will survey the historical and constitutional origins of federal wildlife law and discuss the influence major statutes currently in effect exert on the biopolitics and daily practice of wildlife resource management and conservation. Three hours lecture, including discussions and/or special topics.

BIO 375 Pathophysiology Credits: 4

Typically Offered: Fall, Spring.

Course Description: The etiology, pathogenesis, and manifestations of human diseases, with an emphasis on underlying pathophysiological mechanisms. **Prerequisite(s):** A grade of C or higher in BIO 250 or BIO 311.

BIO 380 Biology Teaching: Materials and Methods Credits: 3

Typically Offered: Departmental Discretion.

Course Description: This course provides pre-service secondary biology teachers with opportunities to develop a framework that can be used to coordinate biological concepts and techniques obtained from science courses with pedagogical concepts and methods from education classes and teaching experiences. The development of a science teaching portfolio is required. Students enrolled in this course must also be available to work in one of the scheduled BIO 101 labs. **Prerequisite(s):** 20 credit hours in science.

BIO 385 Herpetology Credits: 4

Typically Offered: Spring (even-numbered years).

Course Description: Natural history of the amphibians and reptiles, including ecology, biology, evolution, and anatomy, with an emphasis on local species. Three hours lecture and one, three-hour lab each week. One weekend field trip is required. **Prerequisite(s):** A grade of C or higher in BIO 106 and BIO 225.

BIO 390 Microbiology Credits: 4

Typically Offered: Fall.

Course Description: Identification, characteristics, and importance of microorganisms; application to human needs, infection and immunity. Three hours lecture and three hours lab per week. **Prerequisite(s):** A grade of C or higher in BIO 205.

BIO 409 Principles of Terrestrial Wildlife Management Credits: 3

Typically Offered: Spring (even-numbered years).

Course Description: Students will survey the principles, theories, and practices of terrestrial wildlife management. Activities include discussions of local, national, and international issues as well as exploration of major techniques used in the management of terrestrial wildlife resources. Lectures, field experiences, discussions, and in-class activities are integrated throughout the course. **Prerequisite(s):** A grade of C or higher in both BIO 209 and BIO 225.

BIO 411 Developmental Biology Credits: 4**Typically Offered:** Spring.**Course Description:** Examines the morphological changes and the genetic and molecular pathways involved in animal embryonic development. Three hours lecture and three hours lab. **Prerequisite(s):** BIO 205 with a grade of C or higher.**BIO 415 Invertebrate Biology Credits: 4****Typically Offered:** Fall (even-numbered years).**Course Description:** Biology of the invertebrates, emphasizing their taxonomy, anatomy, life cycles, evolution, and ecology. Three hours lecture, three hours lab. **Prerequisite(s):** BIO 106 and BIO 225 with a grade of C or higher.**BIO 416 Vertebrate Biology Credits: 4****Typically Offered:** Spring (odd-numbered years).**Course Description:** Comparative anatomy and physiology, evolution, and systematics of the vertebrates. Three hours lecture, three hours lab. **Prerequisite(s):** BIO 205 and BIO 225 with a grade of C or higher.**BIO 417 Medical Parasitology Credits: 4****Typically Offered:** Spring.**Course Description:** An overview of the biology, ecology, pathology, and medical/veterinary relevance of parasites, with an emphasis on the major protozoal, helminth, and arthropod parasites of humans. Three hours lecture, two hours lab. **Prerequisite(s):** A grade of C or higher in both BIO 205 and BIO 225.**BIO 418 Mammalogy Credits: 4****Typically Offered:** Fall (odd-numbered years).**Course Description:** The morphology, systematics, evolution, taxonomy, distribution, comparative physiology, life history, behavior, and ecology of mammals. Research and collections dealing with mammals will also be a part of this course. Three hours lecture and three hours lab. **Prerequisite(s):** A grade of C or higher in BIO 225.**BIO 419 Animal Behavior Credits: 4****Typically Offered:** Fall.**Course Description:** An introduction to the principles of animal behavior, including the evolutionary, ecological, physiological, and psychological basis of animal behavior. Topics will include social interactions, mating behavior, communication, learning, foraging, predator-prey interactions, and habitat selection. Three hours lecture and three hours lab. Same as PSY 419. **Prerequisite(s):** A grade of C or higher in BIO 105, or a grade of C or higher in both BIO 101 and PSY 101.**BIO 420 Biology Teaching Practicum Credits: 1-2****Typically Offered:** Fall, Spring, Summer.**Course Description:** A laboratory or classroom teaching assistant experience. This experience may not be substituted for other courses required in the student's major area. Course grades assigned on a pass/fail basis. May be repeated for credit. **Prerequisite(s):** Overall GPA 2.75 and departmental approval.**BIO 421 Immunology Credits: 4****Typically Offered:** Spring (odd-numbered years).**Course Description:** Investigation of the cellular and molecular basis of the immune response. Methods in immunology as applied to various fields. Three hours lecture, three hours lab. **Prerequisite(s):** BIO 310 or BIO 390 with a grade of C or higher.**BIO 425 Biology Internship Credits: 1-2****Typically Offered:** Fall, Spring, Summer.**Course Description:** An extracurricular experience related to a unique approved career experience or a Preprofessional experience. Course grades assigned on a pass/fail basis. May be repeated for credit. **Prerequisite(s):** Departmental approval.**BIO 430 Molecular Basis of Disease Credits: 4****Typically Offered:** Spring (even-numbered years).**Course Description:** Investigation of the basic biological causes of human diseases at molecular, cellular, and physiological levels. Three hours lecture, three hours lab per week. **Prerequisite(s):** A grade of C or higher in BIO 205 and a grade of C or higher in either BIO 310, BIO 311, or CHE 370.**BIO 440 Plant Physiology Credits: 4****Typically Offered:** Spring.**Course Description:** This course examines plant functions in the context of plant-environment interactions. The course emphasizes aspects of plant growth and development, water relations and mineral nutrition, plant primary and secondary metabolism, plant-plant and plant-environment interactions, plant stress responses and discusses aspects of advances in plant biotechnology. Laboratory exercises will introduce students to modern investigative lab-bench, greenhouse and field based techniques. Three hours lecture, three hours lab. **Prerequisite(s):** BIO 307 with a grade of C or higher.**BIO 441 Virology Credits: 4****Typically Offered:** Spring (even-numbered years).**Course Description:** Principles of virology that will focus on virus classification, various molecular aspects of virus replication, and pathogenesis. **Prerequisite(s):** A grade of C or higher in BIO 310 or BIO 390.**BIO 450 Independent Research/Project Credits: 1-5****Typically Offered:** Fall, Spring, Summer.**Course Description:** Investigation of a research problem, project, or topic on an individual conference basis. May be repeated for credit. **Prerequisite(s):** Departmental approval.**BIO 455 Entomology Credits: 4****Typically Offered:** Fall (odd-numbered years).**Course Description:** Introduction to the insects that will focus on their taxonomy, natural history, physiology, development, and ecology. Three hours lecture, three hours lab. **Prerequisite(s):** A grade of C or higher in BIO 105, BIO 106 and BIO 225.**BIO 456 Aquatic Ecology Credits: 4****Typically Offered:** Fall (even-numbered years).**Course Description:** This course uses lectures and discussions of primary literature to provide an overview of selected topics in aquatic ecology, including characteristics of different aquatic ecosystems, biology and ecology of aquatic organisms, and current issues in conservation and management of aquatic systems. The lab portion of this course focuses on field techniques and methodology, exploration of local aquatic ecosystems, identification of organisms, and experimental design and data interpretation. This course includes required weekend field trips. Three hours lecture, three hours lab. **Prerequisite(s):** A grade of C or higher in BIO 225.

BIO 461 Renewable Resources Policy and Administration Credits: 3

Typically Offered: Spring (odd-numbered years).

Course Description: This course explores wildlife resources policy and administration from several perspectives. It examines environmental and administrative decision making in developing and implementing policy designed to address contemporary resource management challenges, conflicts and problems as they impact wildlife resources at the state and national level.