

Biology

The biology major deepens students' appreciation for the health profession and life sciences and increases their concern for living things and their environment in addition to developing intellectual competence and technical skills necessary in their chosen careers. After completing the biology requirements, students will be able to employ the scientific method to summarize scientific information and coherently communicate logical conclusions; understand living systems from the molecular level through the organismal level and their ecological interactions, and be able to employ a broad range of analytic and scientific techniques to further their studies.

Career Opportunities

Medical and other health professions such as physical therapy, physician assistant, and occupational therapy. Also, dentistry, veterinary medicine, and pharmacology. Teaching, academic and professional research, industry, park and wildlife management, environmental education, conservation, and many other fields.

See the Graduate section (<http://catalog.mtmercy.edu/graduateprograms/>) of this *Catalog* for more information on Graduate programs offered at Mount Mercy.

Biology Major

Required:

BI 125	Foundations of Biology & Scientific Inquiry I ¹	3
BI 125L	Biostatistics and Scientific Investigation I ¹	1.5
BI 126	Foundations of Biology & Scientific Inquiry II ¹	4.5
BI 127	Foundations of Biology & Scientific Inquiry III ¹	4.5
BI 303	Genetics	4.5
BI 310	Ecology	4.5
CH 111	General Chemistry I	4.5
CH 112	General Chemistry II	4.5
CH 211	Organic Chemistry I	4.5
MA 135	Basic Statistics ³	3

Choose Three Upper Division Electives ² 9

Choose One of the Following: 3-4

MA 139	Pre-Calculus	
MA 164	Calculus I	

Total Hours 51-52

¹ If students earn a C or above (C- does not count), then they do not need to take a statistics course for this major.

² One of which may be CH 302 Biochemistry and at least two major electives courses must be lab courses.

³ MA 135 Basic Statistics is not required if students complete BI 125 Foundations of Biology & Scientific Inquiry I, BI 125L Biostatistics and Scientific Investigation I, BI 126 Foundations of Biology & Scientific Inquiry II, and BI 127 Foundations of Biology & Scientific Inquiry III at Mount Mercy. With permission, PS 325 Statistics and Research Methods for Behavioral Sciences I can be substituted for MA 135 Basic Statistics.

To research and improve the program, all entering and graduating majors are periodically required to take an anonymous assessment examination based upon general biological knowledge. This exam will only be used to assess major strengths, goals, and weaknesses.

Results of this exam will not appear on students' records, nor will the results be used to determine academic progress. An attitudinal survey also will be taken by first-year and senior students.

Academic Requirements

A grade of C or above (C- does not count) in all required courses for the major and the minor. A grade of C or above (C- does not count) is also required in all prerequisite courses for majors and minors before enrolling in required biology, chemistry, and math courses. A cumulative GPA of 2.25 is required in all major and minor courses. Students planning to pursue teacher education should follow the program guidelines within the education section of this *Catalog* and contact an advisor in the Education department for assistance.

Students cannot double major between Biology and Biology - Education.

Biology Minor

Required:

BI 125	Foundations of Biology & Scientific Inquiry I ¹	3
BI 125L	Biostatistics and Scientific Investigation I ¹	1.5
BI 126	Foundations of Biology & Scientific Inquiry II ¹	4.5
BI 127	Foundations of Biology & Scientific Inquiry III ¹	4.5
CH 111	General Chemistry I	4.5
CH 112	General Chemistry II	4.5
MA 135	Basic Statistics ²	3

Choose any two upper division courses, one of which must be a laboratory course 6

Total Hours 31.5

¹ If students earn a C or above (C- does not count), then they do not need to take a statistics course for this minor.

² MA 135 Basic Statistics is not required if students complete BI 125 Foundations of Biology & Scientific Inquiry I, BI 125L Biostatistics and Scientific Investigation I, BI 126 Foundations of Biology & Scientific Inquiry II, and BI 127 Foundations of Biology & Scientific Inquiry III at Mount Mercy. With permission, PS 325 Statistics For Behavioral Sciences can be substituted for MA 135 Basic Statistics.

Pre-Professional Programs in Biology

Mount Mercy also offers several Pre-professional Tracks through the biology program. Pre-professional designation is not recorded on the student transcript.

Students interested in pre-professional programs should notify their advisor as soon as they make that decision.

Pre-Medicine/Pre-Dental

Students interested in pre-med areas can choose between three majors and minors. Majors in biology, chemistry and chemistry: biochemistry are available along with minors in biology and chemistry. Double majors or combinations of a major and minor are easy to accomplish with planned advising from the first term and steady progress. Suggested electives are:

BI 273	Human Anatomy	4.5
BI 315	General Microbiology	4.5
BI 370	Cell and Molecular Biology	5
BI 374	Integrated Physiology	4.5
CH 212	Organic Chemistry II	4.5
CH 302	Biochemistry	4.5

PH 151	Principles of Physics I	4
PH 152	Principles of Physics II	4

Additional suggested courses:

SO 122	Introduction to Sociology	3
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*SO122 not required for Pre-Dental

MA 164	Calculus I	4
PS 224	Developmental Psychology	3

Pre-Physician Assistant

Students pursuing admission to physician assistant programs should follow a similar program to the pre-medical students (above), but they should take more courses in psychology. Some programs require PS 306 Clinical Psychology and Mental Health. Most physician assistant programs require a BS degree.

Pre-Physical Therapy

Most physical therapy programs require a BS degree, which our biology or exercise science major satisfies. Courses needed include:

BI 273	Human Anatomy	4.5
PH 151	Principles of Physics I	4
BI 374	Integrated Physiology	4.5
PH 152	Principles of Physics II	4

Additional suggested courses

MA 139	Pre-Calculus	4
or MA 164	Calculus I	
PS 224	Developmental Psychology	3
PS 306	Clinical Psychology and Mental Health	3

Pre-Occupational Therapy

Admission requirements for occupational therapy programs differ depending on whether the degree sought is graduate or undergraduate. Graduate programs require a BS degree, preferably with a major in biology, but other majors are also a possibility, such as psychology. Students wishing to pursue a graduate degree in occupational therapy should carefully plan a four-year course of study with their advisor that is based upon programs to which they will apply. Most occupational therapy programs require a BS degree.

Pre-Pharmacology

BI 273	Human Anatomy	4.5
BI 315	General Microbiology	4.5
BI 370	Cell and Molecular Biology	5
BI 374	Integrated Physiology	4.5
CH 212	Organic Chemistry II	4.5
PH 151	Principles of Physics I	4
PH 152	Principles of Physics II	4
CH 302	Biochemistry	4.5

Additional suggested courses

MA 164	Calculus I	4
EC 252	Microeconomic Principles	3
EC 251	Macroeconomics Principles	3

The following is the typical sequence of courses required for the major*:

Freshman

Fall	Hours	Winter	Hours	Spring	Hours
BI 125		3 Domain		3 BI 126	4.5
BI 125L	1.5			CH 112	4.5

CH 111	4.5	Writing Competency	4
MA 164 or 139	4	CO 101	3
Portal	3		
	16	3	16

Sophomore

Fall	Hours	Winter	Hours	Spring	Hours
BI 127		4.5 Domain or Elective		3 BI 303	4.5
CH 211	4.5			Domain	3
Domain		3		Domain	3
				Elective	3
	12		3		13.5

Junior

Fall	Hours	Winter	Hours	Spring	Hours
Biology Elective ¹		4.5 Biology Elective or Domain ¹		3 Biology Elective ¹	4.5
Domain		3		Domain	3
Elective		3		Elective	3
Elective		3		Elective	3
	13.5		3		13.5

Senior

Fall	Hours	Winter	Hours	Spring	Hours
Biology Elective or Domain ¹		4.5 Biology Elective or Domain ¹		3 BI 310	4.5
Domain		3		ME 450	1
Elective		3		Domain	3
Elective		3		Elective	3
				Elective	1.5
	13.5		3		13

Total Hours: 123

Note: Elective courses could be used for a second major, a minor, a course of interest, internship or study abroad experience.

Note: See the Curriculum section (<http://catalog.mtmercy.edu/curriculum/#corecurriculumtext>) for more information on Portal, Competency, Domain, and Capstone courses.

¹ Three Biology elective courses are required for the major. Two courses must include a lab.

*Disclaimer

The course offerings, requirements, and policies of Mount Mercy University are under continual examination and revision. This *Catalog* presents the offerings, requirements, and policies in effect at the time of publication and in no way guarantees that the offerings, requirements, and policies will not change.

This plan of study represents a typical sequence of courses required for this major. It may not be applicable to every student. Students should contact a department faculty member to be sure of appropriate course sequence.

Courses

BI 110 Discovering Biology Laboratory: 1 semester hour

Students will perform a variety of biology-based laboratory experiments. Students will learn how to apply the scientific methods as they define problems clearly, analyze data properly and draw appropriate conclusions. This laboratory fulfills the requirement of the Natural World domain for students who have taken a non-laboratory natural science course before transferring or while at Mount Mercy. For traditional students, this course is typically offered during the winter term. For accelerated students, this course is offered online during block 5. (For the online block 5 section, students must order an at-home lab kit estimated cost \$150, lab fee waived). (Traditional students must get permission of the instructor to enroll in the online block 5 version).

BI 120 Forensic Anthropology: 3 semester hours

In this course students will learn how forensic anthropologists use skeletal analyses and other techniques to identify human remains and to discern information about life histories and the manner of death. Students will also learn about the applications of these techniques to individual legal contexts (criminal and missing person cases) as well as international human rights work. Topics to be covered in this class include human skeletal and dental anatomy, skeletal growth and development, excavation and recovery techniques for human remains, as well as postmortem changes to the body. In addition to skeletal analyses, students will also learn about other means of biological identification and crime scene/ burial place investigation including DNA analyses, blood typing, stable and radiogenic isotope analyses, and microbiome and necrobiome studies.

BI 123 Biology of Human Concern: 4 semester hours

For non-science majors. Study of the broad general principles of biology and of current environmental and ethical problems arising as our knowledge and technological competencies increase. Three hours of lecture and one two-hour laboratory per week. (Cannot be taken by Biology majors after successful completion of BI 125). This course fulfills the Natural World Domain requirement for non-major students. (Offered fall and spring semesters).

BI 125 Foundations of Biology & Scientific Inquiry I: 3 semester hours

An introduction to the unifying principles of modern biology with an emphasis on the introductions to the chemistry, structure, function, energy processing, molecular genetics, and reproduction of the cell; as well as Mendelian and non-Mendelian inheritance. No prerequisites. Three hours of lecture per week. Biology majors/minors, medical laboratory science, outdoor conservation, chemistry, exercise science, and education majors should take BI 125 lecture concurrently with BI 125L lab. This course fulfills the Natural World Domain requirement when taken with the BI 125L lab. (Offered fall and spring semesters).

BI 125L Biostatistics and Scientific Investigation I: 1.5 semester hour

A laboratory course designed to reinforce BI 125 through experimentation, data analysis, inquiry, discussion of readings, and communication. The course will include fundamentals of interpretation of scientific writing, introduction to scientific writing, and the foundations of statistical analysis. One three-hour laboratory per week. Students enrolled in BI 125 are not required to take BI 125L, but students enrolled in the laboratory must take BI 125 concurrently or get permission of the instructor to enroll. (Offered fall semester).

BI 126 Foundations of Biology & Scientific Inquiry II: 4.5 semester hours

A laboratory course designed to reinforce BI 125 that focuses on additional topics in inheritance, population genetics, speciation and classification, introduction to ecosystems, and evolution of prokaryotes, protists, and fungi. Additional topics in statistics and scientific communication will also be integral to the course. Three hours lecture and three hours of laboratory per week. Prerequisite: A grade of C or better in BI 125 and BI 125L. (Offered spring semester).

BI 127 Foundations of Biology & Scientific Inquiry III: 4.5 semester hours

The evolution of plants and animals will be surveyed focusing on physiological and anatomical adaptations. Additional topics in statistics and scientific communication will also be integral to the course. Three hours of each lecture and laboratory per week. Prerequisite: A grade of C or better in BI 125 and the BI 125 lab (C- does not count). (Offered fall semester).

BI 150 Basic Microbiology: 4.5 semester hours

Introduction to the study of microorganisms, with special emphasis on medically important bacteria, viruses, and fungi; includes practical applications for control of pathogens, epidemiology and diagnosis, mechanisms of infection and host resistance. Three hours of lecture and one three-hour laboratory. Prerequisite: A grade of C or above (C- does not count) in BI 125 or permission for instructor, not for major/minor credit in biology or medical technology and may not substitute for BI 315. This course fulfills the Natural World Domain requirement for nursing majors. (Offered spring semester).

BI 210 Biology And Human Culture: 3 semester hours

This course will explore the interaction between culture and biology from a variety of perspectives. The customs and belief systems of different societies are often determined by and/or affected by biological factors in addition to environmental constraints and historical interactions. We will study aspects of human culture and social structure in both non-Western and Western cultures from evolutionary and historical perspectives in order to better understand and appreciate different cultural practices and beliefs, how they evolved, and what implications they have for the contemporary world and future civilizations. This course will not count for major/minor biology credit. Prerequisites: One course selected from a core curriculum writing courses, sophomore standing. This course fulfills the Global Awareness Domain requirement. (Offered fall semester in odd years).

BI 220 Tropical Ecosystems: 3 semester hours

This course examines the adaptations and dynamics in tropical ecosystems. Tropical ecosystems hold a vast percentage of total biodiversity, which often includes species with unique adaptations and dynamics to survive in the tropical climate. Both human and natural disturbances are deteriorating tropical ecosystems. Students will study examined these impacts in a systematic manner. This course includes a three weeks trip to a foreign tropical country, which will serve as an on-hands experience studying tropical ecosystems. Prerequisite: A grade of C or better in BI 126 or BI 127 or permission of the instructor.

BI 222 Human Anatomy Fundamentals: 3 semester hours

A lecture-based course designed to give students an understanding of the normal structure, function and development of the human body. A regional approach to anatomy is used with a focus on functional anatomy and the relationship between different tissue types.

BI 225 Global Environmental Issues: 4.5 semester hours

This course examines the human impacts on the global environment in a lecture, discussion and applied approach. Current research will be studied on the causes and effects of environmental change and environmental conservation. Three hours of lecture and one three-hour laboratory per week. Prerequisites: A grade of C or better in BI 125 or BI 123 or equivalent or permission of instructor. (Offered spring semester in even years).

BI 242 Iowa Natural History: 4.5 semester hours

A survey of the natural history of Iowa focusing on geological forces, plant communities, and animal communities, and the impact of early humans, the first European settlers and present residents. The lab will focus on identification of skills. Weekend field trips will be an important component of the course. Three hours of lecture and one three-hour laboratory per week. Prerequisites: A grade of C or better in BI 123, or BI 125 and BI 127, or permission of instructor. (Offered fall semester in even years).

BI 243 Immunology: 3 semester hours

This course introduces students to the major basic concepts operating in the functioning of the immune system and the immunopathologies that arise due to the hyperfunction, hypofunction, or malfunction of this system. Major topics to be covered include non-specific immunity, specific immunity (cellular and humoral) hypersensitivities, immunologic deficiencies, tolerance, enhancement, immunogenetics, autoimmunity, cancer immunology, and transplantation. This introductory course gives students a basic understanding of the system as well as some basic concepts and terminology on which to build further knowledge in this area. Prerequisites: A grade of C or better in BI 125 and BI 126; or BI 125 and BI 150. (Offered winter term in odd years).

BI 273 Human Anatomy: 4.5 semester hours

This is a lecture and laboratory course designed to provide a detailed understanding of the normal structure and development of the human body. A functional anatomical and regional approach is taken in both lecture and laboratory sections. Dissection and examination of preserved human cadavers is a required part of the laboratory portion of the class. Students will be tested over anatomical function and relationships as well as structure identification in a laboratory setting. Three one-hour lectures and one three-hour lab per week. Prerequisite: A grade of C or better in BI 125 for Biology majors, and a D- or better for other majors. (Offered spring semester).

BI 274 Human Physiology: 3 semester hours

A lecture course designed to introduce students to the physiological systems of the human body. Emphasis is given to the interactive nature of these systems that result in normal physiological function. The medical implication of abnormalities and failure of these systems is also briefly covered. Three hours of lecture per week. Prerequisite: A grade of C or better in BI 125 for Biology and Medical Technology major, and a grade of D- or better for other majors. (Offered fall semester).

BI 276 Human Anatomy Laboratory Review: 1.5 semester hour

This is a laboratory course in human anatomy intended for students who have completed previous anatomy coursework in a lecture-based setting. This course is designed to provide a detailed understanding of the normal structure and development of the human body. In this course, a functional anatomical and regional approach is taken and students will use a variety of educational materials and platforms to complete weekly laboratory activities. Students will be tested over structure identification and anatomical relationships. One three-hour lab per week. Prerequisite: A grade of C or better in an approved anatomy lecture course and consent of the instructor.

BI 303 Genetics: 4.5 semester hours

This class is an exploration of heredity: Mendelian (classical), and molecular genetics. Mendelian genetics examines how genes and genetic traits are passed from generation to generation. Molecular genetics probes the structure, function, and regulation of genes. Three hours of lecture and one three-hour laboratory per week. Prerequisites: A grade of a C or better in BI 125 and BI 126, or BI 125 and or BI 127. (Offered spring semester).

BI 305 Evolution: 3 semester hours

This course is an exploration of the evolution of life on earth. In this course students will learn the history of evolutionary thought, the origin and history of life on earth from fossil and molecular evidence, principles of heredity and biological descent, the evidence of organic evolution provided by the various subdisciplines of biology, and the history of animal evolution leading to human evolution. Prerequisites: A grade of C or better in BI 125 and BI 126; or BI 125 and BI 127; or permission of instructor. (Offered winter term in odd years).

BI 310 Ecology: 4.5 semester hours

This course explores a study of the relationships of organisms to each other and to their environment from an evolutionary perspective. Aquatic and terrestrial ecosystems will be studied from the perspective of the individual, the population, and the community. Three hours of lecture and one three-hour laboratory per week. Prerequisite: A grade of C or better in BI 126 or BI 127 or permission of the instructor. Statistics is recommended as is senior status. (Offered spring semester).

BI 315 General Microbiology: 4.5 semester hours

This course studies the diversity and adaptive capabilities of all forms of microbial life, with an emphasis on bacteriology. Topics include bacterial cell structure, metabolism, genetics, ecology, pathogenesis and various biotechnological/diagnostic techniques. Three hours of lecture and one three-hour laboratory per week. Prerequisites: A grade of C or better in BI 125 and BI 126. (Offered each fall semester).

BI 357 Animal Behavior: 4.5 semester hours

This course is a comparative study of the evolution of animal behavior centering on the principles and mechanisms of behavior. Three hours lecture and one three-hour laboratory per week. Prerequisites: A grade of C or better in BI 125 and BI 126, or PS 101 or permission of instructor. (Offered fall semester in odd years).

BI 370 Cell and Molecular Biology: 5 semester hours

This course studies the cell structure and functions common to all eukaryotic organisms including: metabolism, organelle activity, gene expression, cell growth and division, and cell communication. The laboratory component will include learning to use various equipment and protocols scientists use to manipulate and visualize DNA, RNA, and protein in and from cells for research experiments. Three hours of lecture and one four hour of laboratory per week. Prerequisites: A grade of a C or better in BI 125 and BI 127 or permission of instructor. (Offered spring semester in even years).

BI 374 Integrated Physiology: 4.5 semester hours

This lecture-lab course provides science majors with a scientific foundation in human physiology, the study of biological functions and how they work together to keep the body healthy and alive. Topics covered include the function of cells, tissues, organs and organ systems with an emphasis on mechanisms. Students will have an opportunity to apply what he or she has learned in the laboratory with hands-on experiments. Three hours of lecture and one three-hour laboratory each week. Prerequisite: A grade of C or better in BI 125, BI 125L and BI 126, or BI 125, BI 125L and BI 127 (Offered fall semester).

BI 405 Directed Readings in Biology: 3 semester hours

A course initiated by a student, a group of students, or an instructor based upon a topic of interest or a special need. The course will involve readings on the topic, discussion, and projects based upon the topic. Library research and internet research may also be a component along with written summaries of research and/or projects. Under ordinary circumstances this course cannot be used as one of the required electives for the biology major or minor. Prerequisites: Junior or Senior status, grades of C or better in appropriate background courses, and permission of instructor.

BI 440 Biology Internship: 3 semester hours

This is a directed educational experience in employment situations under joint sponsorship by a faculty member and an employer. This course cannot be used as one of the three upper division electives.

BI 445 Independent Study: 3 semester hours

This can be fulfilled by readings and/or research. The course to be designed by the student in consultation with the instructor on a subject of special interest to the student. This course cannot be used as one of the three upper division electives.

BI 450 Independent Research: 3 semester hours

Independent research conducted at Mount Mercy or another recognized institution or research facility. Students will be responsible for collection, analysis, and presentation of original data. Presentation will be in both oral and written format, with the oral portion to be given at a recognized state or national scientific meeting. This course cannot be used as one of the three upper division electives.