BIOLOGY

Faculty and Staff

Jason M. Askvig, chair
Ellen L. Aho, Emeritus-In-Residence
D. Bryan Bishop
Michael R. Bush
Harshana DeSilva Feelixge, laboratory coordinator
John A. Flaspohler
Ivan M. Johnson, Biologist-In-Residence
Ronald L. Nellermoe, Biologist-In-Residence
Carol I. Pratt
Julie C. Rutherford
Krys Strand
Jennifer L. Sweatman
Mallorie Taylor-Teeples
Emerson Towey
Joseph C. Whittaker

The biology department mission is to:

- convey to students an understanding of how the biological sciences inform society
- convey an understanding of how the human population and nature are interacting parts of creation
- explore the limitations, boundaries, and ethical implications of scientific knowledge and practice
- provide students with experiences that introduce them to modern technologies and research methods employed in biology
- develop professional communication skills, including scientific reading, writing and speaking skills
- experience different modes of inquiry in the biological sciences, such as group learning and collaborative problem-solving
- foster respect and appreciation for different modes of inquiry in the biological sciences

Biology students are encouraged to participate in laboratory and/or field research projects, which can be arranged on a directed research basis with faculty members in the biology department. Majors are also regularly employed as laboratory assistants in introductory biology and select upper-division courses, where they gain valuable teaching experience under the direct supervision of a biology staff member.

Programs Offered

Major

- Biology Major (https://catalog.concordiacollege.edu/arts-sciences/biology/biology-major/)

Minor

- Biology Minor (https://catalog.concordiacollege.edu/arts-sciences/biology/biology-minor/)

Biology Education

Students seeking licensure to teach biology must also fulfill the requirements for a major in education (https://catalog.concordiacollege.edu/arts-sciences/education/education-major/). For additional information about teaching biology, see Dr. Krys Strand in biology or the chair of education.

General Science add-on education endorsement: Students majoring in biology and earning a licensure for teaching may complete an add-on option for grades 5-8 licensure (https://catalog.concordiacollege.edu/arts-sciences/education/#endorsementoptionstext).

Courses

BIOL 101 - General Biology, 4 credits.
An examination of the basic concepts of biology and the ways in which biologists ask and answer questions; practical applications of important biological discoveries and their relationships to public issues. Designed for non-majors. Three lectures and four hours of laboratory per week. This course can also count toward the global studies program and the environmental and sustainability studies program.
Frequency: *Every Semester*
Core designations: Natural Science N

BIOL 114 - Genetics and Society, 4 credits.
This course is designed to provide an introduction to modern genetics for non-science students. Topics covered will include the structure and function of DNA, genetic inheritance, medical and non-medical applications of genetic technology, reproductive technologies, forensics, and the genetics of behavior. Three lectures and four hours of laboratory per week.
Frequency: *Every Year - First Semester*
Core designations: Natural Science N

BIOL 121 - Cell Biology, 4 credits.
This course provides an introduction to cell structure and function. Major topics include the scientific method of study, the biochemistry and organization of the cell, mechanisms by which energy is harvested and used by cells, how cells reproduce, and how information is stored and used within a cell. Offered in an integrated lecture/laboratory format.
Frequency: *Every Semester*
Core designations: Natural Science N

BIOL 122 - Evolution and Diversity, 4 credits.
An introduction to the major concept of biology-evolutionary theory. The diversity of life on earth, excluding the vertebrates of the animal kingdom, is then explored in light of this concept. Offered in an integrated lecture/laboratory format. This course can also count toward the environmental and sustainability studies program.
Frequency: *Every Year - Second Semester*
Prerequisites: BIOL 121
Core designations: Natural Science N

BIOL 152 / CHEM 152 - Vocation and the Health Professions, 1 credits.
Intended for freshmen and sophomore students interested in various careers in the health professions. This course offers a balance of personal reflection and practical information. The concept of "vocation as calling" will be emphasized and students will be asked to reflect upon their reasons for choosing a particular career path. Practical information will include various career options in the health professions, undergraduate expectations, professional school admissions requirements, and non-traditional career paths.
Frequency: *Every Year - Second Semester*

BIOL 207 - Fundamental Microbiology, 4 credits.
This course is primarily designed for students in the nursing and nutrition and dietetics programs, however enrollment is open to any interested student. This course examines basic concepts in microbiology, with emphasis placed on bacteria. Three class periods and four hours of laboratory per week.
Frequency: *Every Year - First Semester*
Core designations: Natural Science N

BIOL 221 - Ecology, 4 credits.
Covers the basic principles of energy and nutrient movement through the ecosystems, the forces that structure ecosystems, and the interactions between organisms and the environment and each other. This course emphasizes quantitative skills. Two lectures and four hours of laboratory per week. This course can also count toward the environmental and sustainability studies program.
Frequency: *Every Year - First Semester*
Prerequisites: BIOL 121 and BIOL 122 and (CHEM 127 (may be taken concurrently) or CHEM 137)
Core designations: Natural Science N

BIOL 222 - Genetics and Molecular Biology, 4 credits.
A study of classical genetics, gene structure, and mechanisms of gene expression. This course is writing intensive. Model systems commonly used in molecular genetic research are used in labs. Three lectures and four hours of laboratory per week.
Frequency: *Every Year - Second Semester*
Prerequisites: BIOL 121 and BIOL 122 and BIOL 221 and (CHEM 128 (may be taken concurrently) or CHEM 138 (may be taken concurrently))
Core designations: Natural Science N

BIOL 250 - Pre-May Seminar, 1 credits.
Frequency: *Not offered on a Regular Basis*

BIOL 300 - May Seminar, 4 credits.
Frequency: *May Seminar*
Prerequisites: BIOL 250

BIOL 306 - Human Anatomy and Physiology, 4 credits.
This course, which focuses on the structure and functions of human organ systems and includes examination of human cadavers, is recommended for majors and minors in physical education and for students preparing for allied health professions. It is also open to biology majors and minors who do not take BIOL 411 - Integrated Vertebrate Anatomy and Physiology I. Three lectures and four hours of laboratory per week.
Frequency: *Every Year - Second Semester, Summer Session*
Prerequisites: BIOL 101 or BIOL 121
Core designations: Natural Science N

BIOL 309 - Ornithology, 4 credits.
A study of the form and function of birds, their identification, life history and adaptations. Two lectures and four hours of laboratory per week. This course can also count toward the environmental and sustainability studies program.
Frequency: *Not offered on a Regular Basis*
Prerequisites: BIOL 221 and BIOL 222
Core designations: Natural Science N

BIOL 311 - Entomology, 4 credits.
Introduction to insects and their ecology, their interaction with people via medical and veterinarian entomology, as well as forensic entomology, and the role insects have played in human history. Two lectures and four hours of laboratory per week. This course can also count toward the environmental and sustainability studies program.
Frequency: *Every Year - First Semester*
Prerequisites: BIOL 221 and BIOL 222
Core designations: Natural Science N

BIOL 312 - Mammalogy, 4 credits.
Mammalogy is the study of mammals, their identification, evolution, natural history, and techniques used for scientific study. The course covers anatomy, phylogeny, systematics, ecology, adaptations, physiology, natural history, and current methodology used to study mammals.
Frequency: *Every Year - Second Semester*
Prerequisites: BIOL 221 and BIOL 222
Core designations: Natural Science N

BIOL 313 - Plant Taxonomy, 4 credits.
Identification, nomenclature, and classification of vascular plants. Six hours of lecture and laboratory per week. This course can also count toward the environmental and sustainability studies program.
Frequency: *Not offered on a Regular Basis*
Prerequisites: BIOL 221 and BIOL 222
Core designations: Natural Science N

BIOL 325 / ENVR 325 - Urban Ecology, 4 credits.
Urban Ecology is the study of organisms, their environment, and the physical, chemical, and biological factors that influence them and their interactions in the urban environment. This course is interdisciplinary. As such, it covers the physical and chemical factors of the urban environment; the flora, fauna, and ecosystems that develop therein; the socioecological issues of the urban environment; and conservation and sustainability of urban natural resources. Course consists of two 135-minute integrated lecture/laboratory meetings and one 70-minute student-led journal club per week.
Frequency: *ODD Years - 1st Semester*
Prerequisites: BIOL 221 or ENVR 103
Core designations: Critical Issues, Natural Science N

BIOL 327 / ENVR 327 - Conservation Biology, 4 credits.
Students will develop their understanding of biodiversity, the skills needed to participate in the science and management of Earth's biological systems, and individual perspectives on responsible engagement in the world as scientists and as citizens. There will be a 8-9 day field experience involving hiking and camping. There will be a fee for this field experience.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: BIOL 221 and CHEM 127
Core designations: Natural Science N
This course is Peak Required

BIOL 336 - Histology, 4 credits.
A microscopic study of tissues and organs of vertebrates, with special reference to humans. Three lectures and four hours of laboratory per week. Lab includes introduction to basic histotechnique and digital photomicroscopy.
Frequency: *Every Year - First Semester*
Prerequisites: BIOL 221 and BIOL 222
Core designations: Natural Science N

BIOL 350 - Animal Behavior, 4 credits.
A study of the physiological, ecological, and evolutionary aspects of animal behavior. Labs focus on learning observation skills, terminology, and designing of animal behavior experiments. Three lectures and four hours of laboratory per week. This course can also count toward the environmental and sustainability studies program.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: BIOL 221 and BIOL 222
Core designations: Natural Science N

BIOL 352 - Immunology and Parasitology, 4 credits.
An in-depth study of the human immune system and its regulation. The mechanisms and actions of the humoral and cell-mediated immune systems are emphasized. A portion of the course is devoted to representative parasitic protozoa, helminthes and arthropods, with emphasis on host-parasite interactions. Three lectures and four hours of laboratory per week.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: BIOL 221 and BIOL 222
Core designations: Natural Science N

BIOL 360 / ENVR 360 - Introduction to Geographic Information Systems (GIS), 4 credits.
Students will develop a basic understanding of a GIS and how it is used to make geospatial decisions using the software ArcGIS. Students will learn the use of spatial analytical tools to answer questions and solve problems concerning spatial data, and present their results in professional quality maps. Prerequisite: sophomore standing. Three lectures and four hours of laboratory per week.
Frequency: *Every Year - Second Semester*

BIOL 380 - Special Topics, 0-4 credits.
Courses covering various topics of interest in this particular discipline are offered regularly. Contact department or program chair for more information.
Frequency: *Not offered on a Regular Basis*
Repeatable: Yes

BIOL 390 - Academic Internship, 1-8 credits.
Frequency: *Every Semester*
Repeatable: Yes

BIOL 395 - Internship in Medicine, 4 credits.
Frequency: *Every Semester*
Repeatable: Yes

BIOL 400 / NEU 400 - Neurobiology, 4 credits.
This course expands upon content covered in NEU 109 and BIO 222 and explores a variety of topics including neuroanatomy, neural cell characteristics and communication, and mechanisms of nervous system injury and repair. There is an emphasis on active learning, experimental design, and reading scientific literature. Three lectures and four hours of laboratory per week.
Frequency: *Every Year - First Semester*
Prerequisites: BIOL 222 or NEU 109
Core designations: Natural Science N

BIOL 407 - Microbiology, 4 credits.
This course examines principles and techniques of microbiology, with emphasis placed on bacteria. The role of microorganisms in relation to humans is stressed. Three class periods and four hours of laboratory per week.
Frequency: *Every Year - First Semester*
Prerequisites: BIOL 221 and BIOL 222
Core designations: Natural Science N

BIOL 409 - Limnology, 4 credits.
The scientific study of physical, chemical and biological conditions in freshwater ecosystems. Three lectures and four hours of laboratory per week.
Frequency: *Every Year - First Semester*
Prerequisites: BIOL 221 and BIOL 222
Corequisites: PEAK 400
Core designations: Natural Science N
This course is Peak Required

BIOL 411 - Integrated Vertebrate Anatomy and Physiology I, 4 credits.
Together with BIOL 412, this course focuses on structures and functions of vertebrate organ systems, with primary emphasis on mammals. Included is study of skeletal, muscle, nervous, endocrine, circulatory, respiratory, renal, digestive and reproductive systems, with emphasis on normal homeostatic mechanisms and pathophysiology. Laboratory study includes dissection of the human body, small animal surgery and selected physiological studies. Three lecture sessions and four hours of laboratory per week.
Frequency: *Every Year - First Semester*
Prerequisites: BIOL 221 and BIOL 222
Core designations: Natural Science N

BIOL 412 - Integrated Vertebrate Anatomy and Physiology II, 4 credits.
A continuation of BIOL 411. Three lectures sessions and four hours of laboratory per week.
Frequency: *Every Year - Second Semester*
Prerequisites: BIOL 221 and BIOL 222 and BIOL 411
Core designations: Natural Science N

BIOL 416 - Advanced Topics in Genetics, 4 credits.
This course is intended to follow an introductory course in genetics. It is not a comprehensive course but will cover a variety of topics in depth, typically including cancer genetics, developmental genetics, genetics of complex traits, extranuclear inheritance, quantitative genetics and evolutionary genetics. Three lectures and four hours of laboratory per week.
Frequency: *Alternate Years - 2nd Semester*
Prerequisites: BIOL 221 and BIOL 222 and (CHEM 128 or CHEM 138)
Core designations: Natural Science N

BIOL 425 - Field Botany & Conservation, 4 credits.
Field Botany and Conservation introduces hands-on techniques for plant identification, preservation, and ecological survey methods. Students learn plant terminology, life cycles, and the use of keys, field guides, and digital tools. The course examines plant physiology, community dynamics, ethnobotany, and human land use, emphasizing abiotic and biotic drivers of diversity, conservation priorities, and evolving environmental policy.
Frequency: *EVEN Years - 1st Semester*
Prerequisites: BIOL 221 or ENVR 103
Core designations: Natural Science N

BIOL 444 - Ecology of East Africa, 4 credits.
This biology field course will provide students with the unique opportunity to become immersed in the ecology of east Africa. This field course will teach students plant and wildlife identification skills, basic monitoring and behavioral ecology techniques. Course consists of an intensive 30-day trip in east Africa. There will be a series of meetings the semester prior to departure. PEAK DESCRIPTION: The field experience in Africa is required to complete the Peak.
Frequency: *Not offered on a Regular Basis, May Seminar*
Prerequisites: BIOL 122 and BIOL 221
Corequisites: PEAK 400
Core designations: Natural Science N
This course is Peak Required

BIOL 452 - Health Professions Application Preparation, 1 credits.
This course will allow students to understand the application process for various health professions programs, develop a strong application summary that highlights relevant experiences and qualifications, create a personal statement that effectively communicates motivations and qualifications, understand and learn how to address healthcare ethics and social determinants of health, and determine the best time to apply and develop an effective application strategy.
Frequency: *Every Year - Second Semester*

BIOL 480 - Independent Study, 1-4 credits.
This course provides an opportunity for individual students to conduct in-depth study of a particular topic under the supervision of a faculty member. Contact the department or program chair for more information.
Frequency: *Every Semester*
Repeatable: Yes

BIOL 487 - Directed Research, 1-4 credits.
This course provides an opportunity for individual students to conduct research in a specific area of study, completed under the direction of a faculty mentor. Specific expectations of the research experience to be determined by the faculty. Repeatable for credit. Prerequisite: consent of instructor.
Frequency: *Not offered on a Regular Basis*
Repeatable: Yes

BIOL 497 - Research Seminar, 4 credits.
A directed-research course taught in the style of a graduate school seminar. Students propose, plan and conduct original research, read primary literature, evaluate data and prepare results for presentation. Research integrates multiple science disciplines and encourages development of independent and collaborative research skills. Additional techniques and related topics are discussed.
Frequency: *Every Year-1st or 2nd Semester*
Prerequisites: BIOL 221 and BIOL 222 and (CHEM 128 or CHEM 138)