

# BIOLOGY (BIOL)

## BIOL 113 General Biology 3 Hours

An introductory course in biology for the non-science major, which emphasizes the diversity and organization of life integrated with major principles and new discoveries. **Colonnade/Statewide General Education Code E-NS | NS**

*Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; summer 2023; fall 2023; winter 2024; spring 2024; summer 2024; fall 2024*

## BIOL 114 General Biology Laboratory 1 Hour

A laboratory course correlated with BIOL 113 for non-science majors emphasizing the scientific process, biological concepts and biological organization. **Colonnade/Statewide General Education Code E-SL | SL**  
**Prerequisite(s):** BIOL 113 (may be taken concurrently) with a minimum grade of

*Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; fall 2023; spring 2024; fall 2024*

## BIOL 120 Biological Concepts: Cells Metabolism and Genetics 3 Hours

Introductory course in biology that emphasizes cellular organization and processes, metabolism, DNA structure and replication, and Mendelian and population genetics. **Colonnade/Statewide General Education Code E-NS | NS**

**Corequisite(s):** BIOL 121

*Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; summer 2023; fall 2023; winter 2024; spring 2024; summer 2024; fall 2024*

## BIOL 121 Biological Concepts: Cells, Metabolism, and Genetics Lab 1 Hour

Introductory laboratory in biology that emphasizes the experimental aspects of cellular organization and processes, metabolism, DNA structure and replication, and Mendelian and population genetics.

**Colonnade/Statewide General Education Code E-SL | SL**

**Corequisite(s):** BIOL 120

*Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024*

## BIOL 122 Biological Concepts: Evolution, Diversity, and Ecology 3 Hours

Introductory course in biology that emphasizes evolutionary patterns and processes, diversity of life (bacteria, archaea, protists, plants, fungi, and animals), ecological principles, and conservation and management.

**Colonnade/Statewide General Education Code E-NS | NS**

**Corequisite(s):** BIOL 123

*Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; summer 2023; fall 2023; winter 2024; spring 2024; summer 2024; fall 2024*

## BIOL 123 Biological Concepts: Evolution, Diversity, and Ecology Lab 1 Hour

Introductory laboratory in biology for science majors that emphasizes the experimental aspects of evolutionary patterns and processes, diversity of life (bacteria, archaea, protists, plants, fungi, and animals), ecological principles, and conservation and management. **Colonnade/Statewide General Education Code E-SL | SL**

**Corequisite(s):** BIOL 122

*Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024*

## BIOL 131 Human Anatomy and Physiology 4 Hours (repeatable max of 4 hrs)

A basic anatomy and physiology course designed for students in physical education and health science careers. Emphasis is placed upon the concept of homeostasis and relationship of structure and function.

**Colonnade/Statewide General Education Code E-SL, E-NS | NS, SL**

*Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024*

## BIOL 175 UNIVERSITY EXPERIENCE-BIOLOGY 2 Hours

Transition to university experience. Topics include study skills, critical thinking skills, library education, exploration of majors and careers, degree programs, campus resources, and personal development. Special attention is given to educational requirements, careers, and resources in the field of biology.

**Restriction(s):** Enrollment limited to students with a semester level of Freshman.

*Recent Term(s) Offered: None*

## BIOL 207 General Microbiology 3 Hours

An introduction to microorganisms and their importance to humans (for non-biology majors). Approximately one third of the course is devoted to each of the three major areas of microbiology: organismal, environmental, and medical. (May be taken with or without the correlated laboratory course, BIOL 208, dependent upon the student's curriculum requirements). **Colonnade/Statewide General Education Code E-NS | NS**

*Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; summer 2023; fall 2023; winter 2024; spring 2024; summer 2024; fall 2024*

## BIOL 208 General Microbiology Laboratory 1 Hour

A laboratory course correlated with BIOL 207. **Colonnade/Statewide General Education Code E-SL | SL**

**Prerequisite(s):** (BIOL 207 (may be taken concurrently) or BIO 207C (may be taken concurrently))

*Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; fall 2024*

## BIOL 212 Genome Discovery Exploration 2 Hours

Discovery, characterization, and genomic analysis of viruses from sample collection and purification through DNA isolation and analysis.

*Recent Term(s) Offered: fall 2022; fall 2023; fall 2024*

## BIOL 222 Plant Biology and Diversity 3 Hours

Survey of cyanobacteria, algae and plants with an emphasis on anatomy, morphology, development, physiology and evolutionary adaptations.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

**Corequisite(s):** BIOL 223

*Recent Term(s) Offered: fall 2022*

## BIOL 223 Plant Biology and Diversity Lab 1 Hour

A laboratory course correlated with BIOL 222.

**Corequisite(s):** BIOL 222

*Recent Term(s) Offered: fall 2022*

**BIOL 224 Animal Biology and Diversity 3 Hours**

Survey of animal phyla and major classes with emphasis upon morphological adaptations and biological systems that have evolved to maintain organismal and population homeostasis.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

**Corequisite(s):** BIOL 225

*Recent Term(s) Offered: winter 2022; spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; summer 2023; fall 2023; spring 2024; fall 2024*

**BIOL 225 Animal Biology and Diversity Lab 1 Hour**

A laboratory course correlated with BIOL 224.

**Corequisite(s):** BIOL 224

*Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024*

**BIOL 226 Microbial Biology and Diversity 3 Hours**

A study of morphological, cultural, and biochemical characteristics of important groups of bacteria.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

**Corequisite(s):** BIOL 227

*Recent Term(s) Offered: fall 2022; spring 2023; fall 2023; summer 2024; fall 2024*

**BIOL 227 Microbial Biology and Diversity Lab 1 Hour**

A laboratory course correlated with BIOL 226.

**Corequisite(s):** BIOL 226

*Recent Term(s) Offered: fall 2022; spring 2023; fall 2023; fall 2024*

**BIOL 231 Advanced Human Anatomy and Physiology 4 Hours**

(repeatable max of 4 hrs)

Human anatomy and physiology for health science career students emphasizing an integrated organ systems approach to body function.

**Prerequisite(s):** (BIOL 131 with a minimum grade of C or BIO 131C with a minimum grade of C)

*Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; summer 2024; fall 2024*

**BIOL 275 Colloquia 1-3 Hours** (repeatable max of 3 hrs)

Issues of contemporary, historical or intellectual significance in Biology, often with ethical implications will be weighed and debated. May not be used to satisfy the general education requirement in natural sciences. May be repeated with a maximum of 3 hours counting for the Biology major or minor.

*Recent Term(s) Offered: None*

**BIOL 285 Introduction to Field Biology 1-4 Hours** (repeatable max of 4 hrs)

An introductory field experience on a specific biological or ecological topic.

*Recent Term(s) Offered: winter 2023; winter 2024*

**BIOL 295 Introduction to Research Methodology 1 Hour**

To familiarize Ogden Research Scholars and other research oriented students with the fundamentals of choosing a research topic, performing a bibliographical search on a subject, classification of instruments, data taking, data reduction, professional ethics and other research oriented topics. The common points of research methodology in the different scientific areas will be accentuated. Examples will be drawn from the various disciplines. Use of computers will be emphasized. (Course does not count towards any major or minor). Note: Ogden Research Scholar, or 3.2 grade point average at the end of freshman year, or OCSE faculty member recommendation required.

**Equivalent(s):** PHYS 295, MATH 295, CHEM 295, ENGR 295, CS 295

*Recent Term(s) Offered: None*

**BIOL 303 Life Science for Middle Grades Teachers 1-3 Hours**

(repeatable max of 4 hrs)

Pedagogical content and knowledge in life sciences with practicum experience for middle school teachers. Not available for credit toward and biology, chemistry, or biochemistry major or minor. Note: 6 hours of SMED 200 level and above courses is required for course enrollment.

**Prerequisite(s):** BIOL 120 and BIOL 121 and BIOL 122 and BIOL 123

*Recent Term(s) Offered: spring 2022; spring 2024*

**BIOL 312 Bioinformatics 4 Hours** (repeatable max of 4 hrs)

Presentation of the theoretical underpinnings and the computational methods of nucleic acid and protein sequence analyses used in genomic work. An associated laboratory component will provide project-based application of these methods.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C

*Recent Term(s) Offered: spring 2022; summer 2022; spring 2023*

**BIOL 315 Ecology 3 Hours**

A study of the fundamental principles of ecology.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered: spring 2022; fall 2022; fall 2023; fall 2024*

**BIOL 316 Evolution: Theory and Process 3 Hours**

Study of the genetic, behavioral and ecological mechanisms leading to evolutionary change, and the role of evolutionary theory as a unifying framework in biology.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered: spring 2022; summer 2022; winter 2023; spring 2023; summer 2023; winter 2024; spring 2024; summer 2024*

**BIOL 317 Plant Pathology 3 Hours** (repeatable max of 3 hrs)

Introduction to common plant pathogens and diseases of agronomically important field and forage crops, turf, vegetables, and ornamentals. Topics include control measures, newly discovered diseases, and plant-pathogen interactions.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered: summer 2023*

**BIOL 319 Introduction to Molecular and Cell Biology 3 Hours**

Introduction to molecular and cell structure, relating molecular structure and function to cell structure and function. Special emphasis on protein and nucleic acid structure and function and their role in coordinating cellular activities.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C and CHEM 120 and CHEM 121

*Recent Term(s) Offered:* winter 2022; spring 2022; summer 2022; fall 2022; winter 2023; spring 2023; fall 2023; spring 2024

**BIOL 321 Comparative Anatomy 4 Hours** (repeatable max of 4 hrs)

A comparative study of the morphology and relationships of the organ systems of some typical vertebrates.

**Prerequisite(s):** BIOL 224 and BIOL 225

*Recent Term(s) Offered:* spring 2022; spring 2023; spring 2024

**BIOL 322 Introduction to Molecular and Cell Biology Laboratory 1 Hour**

Laboratory course presenting fundamental techniques for the isolation and characterization of biological molecules, with an emphasis on proteins and nucleic acids.

**Prerequisite(s):** BIOL 319 (may be taken concurrently)

*Recent Term(s) Offered:* spring 2022; spring 2023; spring 2024

**BIOL 325 Insect Biodiversity 3 Hours** (repeatable max of 3 hrs)

Study of insects, the most diverse group of animals, including their unusual morphology, behavior, ecology, and evolutionary relationships. Laboratory activities include required off-campus trips to regional habitats and surveys of global insect groups.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* fall 2022; fall 2023; fall 2024

**BIOL 326 Ornithology 3 Hours**

A study of the general characteristics, economic importance, history, structure, classification, and identification of birds.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* spring 2023

**BIOL 327 Genetics 3 Hours**

A study of the fundamental principles of heredity in eukaryotic organisms.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* fall 2022; summer 2023; fall 2023; summer 2024; fall 2024

**BIOL 328 Immunology 3 Hours**

An introductory study of the vertebrate immune system and its relationship to organismic integrity.

**Prerequisite(s):** (BIOL 319 with a minimum grade of C and BIOL 322 with a minimum grade of C) or (BIOL 327 with a minimum grade of C and BIOL 337 with a minimum grade of C)

*Recent Term(s) Offered:* spring 2022; spring 2023

**BIOL 330 Animal Physiology 3 Hours**

Examination of the general principles by which animals function.

Major organ systems of animals are explored with emphasis on the communication and interactions between them. Numerous vertebrate and invertebrate systems are used to illustrate physiological concepts.

**Prerequisite(s):** BIOL 224 and BIOL 225 and CHEM 120 and CHEM 121

*Recent Term(s) Offered:* fall 2022; fall 2023; fall 2024

**BIOL 331 Animal Physiology Laboratory 1 Hour**

A laboratory course that emphasizes experimental design and hypothesis testing, along with classic and modern techniques used in animal physiology.

**Prerequisite(s):** BIOL 330 (may be taken concurrently)

*Recent Term(s) Offered:* fall 2023; fall 2024

**BIOL 332 Principles of Wildlife Ecology 3 Hours**

Examination of the principles of wildlife ecology and management, including ecological theory, population regulation, habitat management, wildlife diseases, and conservation. Primarily for those interested in a career involving wildlife.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* fall 2022; fall 2023; fall 2024

**BIOL 334 Animal Behavior 3 Hours**

Examination of the evolutionary basis of behavior in animals. Topics include genetic and physiological basis of behavior, communication, animal cognition, migration, foraging, predator avoidance, courtship and mate choice, and sociality.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* spring 2024

**BIOL 335 Neurobiology 3 Hours**

The nervous system is described at the molecular, cellular and systemic level. Topics include the structure of neurons, how neurons transmit signals, sensory systems, brain organization, and neural development, as well as how these principles affect behavior and health.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* fall 2022; fall 2023

**BIOL 336 Food Microbiology 3 Hours**

A comprehensive understanding of food microbiology, including foodborne pathogenic bacteria, beneficial bacteria, microbial impact on food processing, control of microorganisms in food, and food regulations. This course may include off-campus travels to food processing companies or government laboratories.

**Prerequisite(s):** BIOL 226 and BIOL 227

*Recent Term(s) Offered:* None

**BIOL 337 Genetics Laboratory 1 Hour**

A laboratory-based study of genetics, genomics, and population genetics. Modern laboratory techniques are emphasized.

**Prerequisite(s):** BIOL 327 (may be taken concurrently)

*Recent Term(s) Offered:* fall 2022; fall 2023; fall 2024

**BIOL 338 Immunology Lab 1 Hour**

A laboratory course in immunology that emphasizes on learning immunological techniques and their applications through experimental design and hypothesis testing, including classic and modern methods used in hematology and serology.

**Prerequisite(s):** BIOL 328 (may be taken concurrently)

*Recent Term(s) Offered: None*

**BIOL 348 Plant Taxonomy 4 Hours** (repeatable max of 4 hrs)

Identification of local plant species and survey of major vascular plant families emphasizing morphological diversity, evolutionary relationships and economic uses. Field trips required.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered: spring 2022; spring 2023*

**BIOL 350 Introduction to Recombinant Genetics 3 Hours** (repeatable max of 3 hrs)

This course will introduce students to the basic mechanisms of genetic recombination, both in living cells and in vitro. Topics that will be discussed include: genomic organization, genetic recombination, genetic mapping, gene cloning and cloning vectors, and physical mapping of genes. The laboratory will cover methods for the isolation, cloning, labeling, and reintroduction into cells of recombinant vectors.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered: spring 2022; spring 2023; spring 2024*

**BIOL 351 Indian Himalayas - Biogeography, Ganges & Culture 3 Hours**

An interdisciplinary study-abroad course that includes studies in biology, history, culture and religion related to India. **Colonnade/Statewide General Education Code K-IE**

**Prerequisite(s):** 21 hours of Foundations and Explorations Courses, or junior status

*Recent Term(s) Offered: None*

**BIOL 355 Ecology Lab 2 Hours**

A field-oriented, science process course where students learn to perform research and gain experience in ecology.

**Prerequisite(s):** BIOL 315 (may be taken concurrently)

*Recent Term(s) Offered: fall 2022*

**BIOL 356 Ornithology Lab 2 Hours**

The taxonomy, morphology, and natural history of birds of Kentucky. Off-campus travel will be required.

**Prerequisite(s):** BIOL 326 (may be taken concurrently)

*Recent Term(s) Offered: spring 2023*

**BIOL 369 Internship in Biology 1-3 Hours** (repeatable max of 6 hrs)

Practical experience in a supervised, professional work environment in an instructional classroom, business, industry, government agency or laboratory setting.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; summer 2023; fall 2023; spring 2024; fall 2024*

**BIOL 372 Causes and Consequences of Human-Wildlife Conflict 3 Hours**

Global study of human-wildlife conflict and the varying ecological, social, economic, and cultural realities that influence this conflict. **Colonnade/Statewide General Education Code K-LG**

**Prerequisite(s):** 21 hours of Foundations and Explorations Courses, or junior status

*Recent Term(s) Offered: spring 2022; spring 2024*

**BIOL 377 Animal Form and Function 3 Hours**

Mechanistic designs underlying organismal morphology, physiology driving designs, and behaviors that impact function. Topics include comparative anatomy, adaptation, ecomorphology, biological basis of physical principles, and organismal performance.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered: spring 2022; spring 2023; spring 2024*

**BIOL 380 Challenges of a Changing Biosphere 3 Hours**

A focus on environmental issues from a biological perspective with emphasis on Habitat loss, Invasive species, Population growth, Pollution, and Overharvesting (HIPPO) in light of climate change and extinction.

**Colonnade/Statewide General Education Code K-LG**

**Prerequisite(s):** 21 hours of Foundations and Explorations Courses, or junior status

*Recent Term(s) Offered: spring 2022; spring 2023; spring 2024*

**BIOL 382 Introductory Biostatistics 3 Hours** (repeatable max of 3 hrs)

Introduction to statistical techniques and experimental design applied to the biological sciences. Probability and distributions, descriptive statistics, hypothesis testing and statistical inference using t-statistics, regression, ANOVA, chi-square, non-parametric tests. Use of computers and analysis of real data are emphasized.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C and (MATH 116 or MATH 136)

*Recent Term(s) Offered: spring 2022; spring 2023; spring 2024*

**BIOL 388 Contemporary Issues in Biotechnology 1 Hour** (repeatable max of 1 hrs)

Examination of recent advances, ethics and career opportunities in biotechnology through discussions, seminars, and field trips.

**Restriction(s):** Enrollment is limited to students in Molecular Biotechnology (738)

*Recent Term(s) Offered: spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024*

**BIOL 390 Ethnobiology-Peoples, Plants & Animals 3 Hours**

Interdisciplinary study of the relationships of plants and animals with human cultures worldwide, including past and present relationships between peoples and the environment. **Colonnade/Statewide General Education Code K-SY**

**Prerequisite(s):** 21 hours of Foundations and Explorations Courses, or junior status

*Recent Term(s) Offered: spring 2023; spring 2024*



**BIOL 397 Scientific Process 2-4 Hours** (repeatable max of 4 hrs)

An in-depth experience with scientific research from concept through dissemination.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* fall 2022; fall 2023; spring 2024; fall 2024

**BIOL 399 Research in the Biological Sciences 1-3 Hours** (repeatable max of 6 hrs)

A study involving a research project under faculty supervision. Note: The course may be repeated with a maximum of (6) (ref. 525) or 3 hours (ref. 617) counted toward the major.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; summer 2024; fall 2024

**BIOL 403 Molecular Basis of Cancer 3 Hours**

Biological and molecular features of oncogenesis and clinical cancer, focusing on specific molecular events underlying carcinogenesis, metastasis and angiogenesis. Case study learning is integrated into the course to help students understand the societal implications of cancer.

**Prerequisite(s):** BIOL 319 and BIOL 322

*Recent Term(s) Offered:* summer 2024

**BIOL 404 Techniques and Theory of Electron Microscopy 4 Hours** (repeatable max of 4 hrs)

A course in the fundamentals of electron microscopy including basic theory, techniques for specimen preparation and photography, and operation of the electron microscope.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* fall 2022; fall 2023; fall 2024

**BIOL 407 Virology 3 Hours**

Study of bacterial, animal and plant viruses. Emphasis on the molecular aspects of the viral life cycle and pathogenesis.

**Prerequisite(s):** BIOL 319 and BIOL 322

*Recent Term(s) Offered:* summer 2022

**BIOL 411 Cell Biology 3 Hours**

A lecture series emphasizing the morphological and chemical make-up of cells, the physical and chemical properties of the cell, and modern techniques for investigation of cellular functions.

**Prerequisite(s):** ((BIOL 319 and BIOL 322) or (BIOL 327 and BIOL 337))

*Recent Term(s) Offered:* spring 2022; summer 2022; spring 2023; summer 2023; winter 2024; spring 2024; summer 2024

**BIOL 412 Cell Biology Laboratory 1 Hour**

A laboratory course correlated with BIOL 411.

**Prerequisite(s):** BIOL 411 (may be taken concurrently)

*Recent Term(s) Offered:* spring 2022; spring 2023; spring 2024

**BIOL 420 Introduction to Toxicology 3 Hours**

Toxicology is the study of the adverse effects of inorganic and organic molecules on living organisms. The course will provide an understanding of the basic principles of toxicology for undergraduate majors and minors in the natural sciences.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C and CHEM 340

*Recent Term(s) Offered:* None

**BIOL 440 Developmental Genetics 3 Hours**

A descriptive investigation of the genetic and biochemical processes that regulate development of microbes, plants and animals.

**Prerequisite(s):** (BIOL 319 and BIOL 322) or (BIOL 327 and BIOL 337)

*Recent Term(s) Offered:* None

**BIOL 446 Biochemistry I 3 Hours**

A study of biochemical compounds and their role in intermediary metabolism. Special topics include biochemical energetics and coenzyme mechanisms.

**Prerequisite(s):** CHEM 340 with a minimum grade of C

**Equivalent(s):** CHEM 446

*Recent Term(s) Offered:* winter 2022; spring 2022; summer 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

**BIOL 447 Biochemistry Laboratory 2 Hours**

A basic laboratory study involving selected experiments which illustrate biochemical principles including separation, identification and chemical properties of carbohydrates, lipids, proteins and enzymes.

**Prerequisite(s):** BIOL 446 (may be taken concurrently) with a minimum grade of C or CHEM 446 (may be taken concurrently) with a minimum grade of C

**Equivalent(s):** CHEM 447

*Recent Term(s) Offered:* spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

**BIOL 450 Recombinant Gene Technology 3 Hours**

Discovery-based laboratory emphasizing application of basic techniques to solve student-defined problems. Problems in characterization and expression of genetic material are explored.

**Prerequisite(s):** BIOL 350

*Recent Term(s) Offered:* fall 2022; fall 2023; fall 2024

**BIOL 456 Ichthyology 4 Hours** (repeatable max of 4 hrs)

A survey of the fishes of the world, their physiology, structure, behavior, and ecology. Special emphasis will be placed upon the collection and identification of freshwater species of Kentucky.

**Prerequisite(s):** BIOL 224 and BIOL 225

*Recent Term(s) Offered:* fall 2023

**BIOL 457 Herpetology 4 Hours** (repeatable max of 4 hrs)

The diversity, biology, and conservation of reptiles and amphibians. Off-campus travel will be required.

**Prerequisite(s):** BIOL 224 with a minimum grade of C and BIOL 225 with a minimum grade of C

*Recent Term(s) Offered:* spring 2022; spring 2024

**BIOL 458 Fisheries Management 4 Hours** (repeatable max of 4 hrs)  
A study of the factors affecting fish populations. Topics covered include life history traits, sampling techniques, management practices, and policies regulating the management of fish populations. Off-campus and overnight weekend field trips and a course fee are required.

**Prerequisite(s):** BIOL 224 and BIOL 225

*Recent Term(s) Offered:* fall 2022; fall 2024

**BIOL 459 Mammalogy 3 Hours** (repeatable max of 3 hrs)  
Taxonomy, life history and ecology of the mammals. Laboratory work includes field studies and collection and study of specimens in the laboratory.

**Prerequisite(s):** BIOL 224 and BIOL 225

*Recent Term(s) Offered:* spring 2023

**BIOL 464 Endocrinology 3 Hours**  
A study of the structure and function of the endocrine glands and their role in physiological communication and regulation.

**Prerequisite(s):** BIOL 319 and BIOL 322

*Recent Term(s) Offered:* fall 2023

**BIOL 467 Biochemistry II 3 Hours**  
A study of the reactions of living systems and an introduction to the mechanisms and energetics of metabolism.

**Prerequisite(s):** (BIOL 446 or CHEM 446)

**Equivalent(s):** CHEM 467

*Recent Term(s) Offered:* spring 2022; spring 2023; spring 2024

**BIOL 470 Pathogenic Microbiology 4 Hours** (repeatable max of 4 hrs)  
A study of the organisms causing disease with emphasis on bacteria. The course will survey pathogenic bacteria, viruses, fungi, and protozoa.

**Prerequisite(s):** BIOL 226 and BIOL 227

*Recent Term(s) Offered:* spring 2022; spring 2024

**BIOL 472 Applied and Environmental Microbiology 4 Hours**  
(repeatable max of 4 hrs)  
A study about the roles of microorganisms in environmental systems and their applications in biotechnology, agriculture, and industry. The course will provide an overview of microbial technologies that are used for the benefit of humans including production of microbial products of industrial interest, bioremediation, wastewater treatment, and the use of microbes in sustainable practices.

**Prerequisite(s):** (BIOL 226 and BIOL 227)

*Recent Term(s) Offered:* None

**BIOL 475 Selected Topics in Biology 1-3 Hours** (repeatable max of 6 hrs)

A consideration of special topics to acquaint the advanced student with significant problems and developments of current interest in biology.

*Recent Term(s) Offered:* spring 2022; summer 2022; fall 2022; fall 2023; spring 2024; summer 2024

**BIOL 477 Marine Biology 3 Hours**  
Marine organisms are examined within a framework of basic biological principles and processes that are fundamental to all forms of life in the sea, including evolution, ecology, biodiversity, biogeography, behavior, and physiology.

**Prerequisite(s):** BIOL 224 and BIOL 225

*Recent Term(s) Offered:* fall 2022; fall 2023; fall 2024

**BIOL 483 Multivariate Methods in Biology 4 Hours**  
Application of multivariate statistical analysis techniques to problems in the biological sciences. Principal component and factor analysis, canonical discriminant analysis, correspondence analysis, distance metrics and clustering, canonical correlation, repetitive sampling, randomization. Not a course in mathematical statistics; rather, emphasis is on experimental design, selection of appropriate methods for testing a particular hypothesis, and the analysis of real data.

**Prerequisite(s):** (BIOL 382 or permission of instructor)

**Restriction(s):** Students with a semester level of Academy Junior, Academy Senior, Freshman or Sophomore may **not** enroll.

*Recent Term(s) Offered:* None

**BIOL 485 Field Biology 1-4 Hours** (repeatable max of 4 hrs)  
An intensive field experience on a specific biological or ecological topic.  
*Recent Term(s) Offered:* summer 2022; fall 2022; winter 2023; summer 2023; summer 2024

**BIOL 489 Professional Aspects of Biology 1 Hour**  
Current topics and the role of science in society, participation in seminars, evaluation of biological skills and knowledge, preparation for careers in biology, and construction of an alumnus action plan.

**Prerequisite(s):** (BIOL 315 or BIOL 316 or BIOL 319 or BIOL 327)

**Restriction(s):** Students with a semester level of Academy Junior, Academy Senior, Freshman, Junior or Sophomore may **not** enroll.

*Recent Term(s) Offered:* spring 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

**BIOL 490 Plants as Alternative Therapeutics 3 Hours**  
Exploration of plants used in traditional medicine with emphasis on pharmacological implications as evidenced in modern clinical research. Examines therapeutic actions of phytochemicals on major human illnesses.

**Prerequisite(s):** BIOL 120 with a minimum grade of C and BIOL 121 with a minimum grade of C and BIOL 122 with a minimum grade of C and BIOL 123 with a minimum grade of C

*Recent Term(s) Offered:* summer 2022; summer 2023; summer 2024

**BIOL 492 Clinical Internship in Medical Technology 8 Hours**  
An internship in an accredited medical technology school with a curriculum that includes both daily instruction in basic theory and corresponding laboratory experience. Note: Student must have completed the course requirements in medical technology and have been accepted to an accredited medical technology school.

*Recent Term(s) Offered:* summer 2022; summer 2023; summer 2024

**BIOL 493 Clinical Internship in Medical Technology 14 Hours**  
An internship in an accredited medical technology school with a curriculum that includes both daily instruction in basic theory and corresponding laboratory experience. Note: Student must have completed the course requirements in medical technology and have been accepted to an accredited medical technology school.

*Recent Term(s) Offered:* fall 2022; fall 2023; fall 2024

**BIOL 494 Clinical Internship in Medical Technology 14 Hours**  
An internship in an accredited medical technology school with a curriculum that includes both daily instruction in basic theory and corresponding laboratory experience. Note: Student must have completed the course requirements in medical technology and have been accepted to an accredited medical technology school.

*Recent Term(s) Offered:* spring 2022; spring 2023; spring 2024

**BIOL 495 Molecular Genetics 3 Hours**

A study of the molecular basis of genetics in prokaryotic and eukaryotic organisms.

**Prerequisite(s):** (BIOL 319 or BIOL 327)

*Recent Term(s) Offered: summer 2022; fall 2022; summer 2023; fall 2023; fall 2024*

**BIOL 496 Plant Biotechnology 4 Hours** (repeatable max of 4 hrs)

A course designed to illustrate the current advances in plant biotechnology and their potential application in agriculture, health and environment.

**Prerequisite(s):** ((BIOL 319 and BIOL 322 and AGRO 110) or (BIOL 222 and BIOL 223))

*Recent Term(s) Offered: None*

**BIOL 497 Aquatic Field Ecology 4 Hours** (repeatable max of 4 hrs)

An integrated study of aquatic ecosystem structure and function, including the physical and chemical properties of water and application of biological field methods. This course requires off-campus travel.

**Prerequisite(s):** ((BIOL 222 and BIOL 223) or (BIOL 224 and BIOL 225) or (BIOL 226 and BIOL 227)) and CHEM 120 and CHEM 121

**Restriction(s):** Students with a semester level of Freshman or Sophomore may **not** enroll.

*Recent Term(s) Offered: summer 2022; fall 2022; summer 2023; summer 2024; fall 2024*