

BIOLOGY (BIOLOGY)

Courses

BIOLOGY 120 BIOLOGICAL FOUNDATIONS 4 Units

A terminal course designed to introduce basic principles of life, such as structure and function, reproduction, evolution, diversity, and adaptation, leading to a broader understanding of humans and their biological environment. Not applicable to biology emphases or minors. Three lectures and two hours of laboratory per week.

COREQ: MATH 139 OR MATH 140 OR MATH 142 OR WAIVER

BIOLOGY 141 INTRODUCTORY BIOLOGY I 5 Units

An introduction to biology emphasizing the chemistry of life, the cell, metabolism, genetics, bacteria and protists. Three hours of lecture and one hour of discussion and two hours of laboratory per week. This course is prerequisite to all advanced courses in biology for majors and minors. Offered every term.

PREREQ: C OR BETTER IN (MATH 139 OR MATH 141 OR MATH 142),
CONCURRENT ENROLLMENT IN MATH 142 ALLOWED

BIOLOGY 142 INTRODUCTORY BIOLOGY II 5 Units

An introduction to biology emphasizing evolution, animal physiology, ecology, fungal, plant and animal diversity. Dissections are required. Three hours of lecture, one hour of discussion and two hours of laboratory per week. This course is prerequisite to all advanced courses in biology for majors and minors. Offered every term.

PREREQ: (C OR BETTER IN BIOLOGY 141 AND (MATH 141 OR MATH 142))

BIOLOGY 180 SEX, GENDER, AND HEALTH 3 Units

This course explores the reproductive and sexual functions of human bodies, as well as the scientific and social influences on those bodies. By examining sex, reproduction, and aging, this course uses intersectional lenses to explore uneven access to sexual health resources and reproductive justice across cultures, ultimately demonstrating the achievements and limitations of women's health movements in the recent past.

BIOLOGY 190 BIOLOGY FORUM 1 Units

Lectures on current research and career opportunities in biology through invited speakers. Additional topics include preparation and planning for graduation, Resume development and interview skills. Required of Biology majors. Offered on a satisfactory/no credit basis every semester. PREREQ: BIOLOGY 142 WITH A GRADE OF C OR BETTER. COURSE RESTRICTED TO BIOLOGY MAJORS AND MINORS.

BIOLOGY 200 WRITING IN BIOLOGY 3 Units

This course is designed to develop the written communication skills of Biology students. It satisfies the Writing Proficiency requirement for all Biology majors. This course does not apply towards any Biology major or minor.

PREREQ: C OR BETTER IN (ENGLISH 102 AND BIOLOGY 141 AND BIOLOGY 142)

BIOLOGY 214 ECOLOGY AND SOCIETY 3 Units

A study of basic ecological concepts and their application to the identification, understanding, and abatement of contemporary environmental problems. Special emphasis is given to those problems resulting from man and his activities. This course is accepted as a course in conservation required for teacher licensure in the sciences.

BIOLOGY 215 EXPLORING ECOLOGICAL ISSUES IN SOCIETY 4 Units

A study of basic ecological concepts and their application to the identification, understanding, and abatement of contemporary environmental problems. Special emphasis is given to those problems resulting from humanity's activities. This course includes a laboratory component concentrating on hands-on activities that will explore ecological phenomena and how human activity can alter how our natural world functions. This course fulfills the conservation requirement for teacher licensure in the sciences.

BIOLOGY 220 INTRODUCTION TO EPIDEMIOLOGY 3 Units

Introduction to basic principles of tracking changes in health indicators and problems in modern society. We will cover both current and historical cases to learn techniques of gathering information, analysis, and application. Problems will include infectious diseases, environmental problems, and other areas of concern in population health.

PREREQ: MATH 139 OR MATH 141 OR MATH 142

BIOLOGY 225 SCIENCE OF FORENSIC ANALYSIS 4 Units

An introduction to the scientific foundation of techniques used for criminal investigation.

PREREQ: MATH 142 OR MATH 141 OR MATH 139, AND ONE UNIVERSITY LEVEL LAB SCIENCE COURSE.

BIOLOGY 241 BIOLOGY OF AGING 3 Units

The goal of this course is to introduce students to the biological process of aging. The course covers current concepts and knowledge of the aging process, including cellular and molecular research, oxidative stress and DNA repair. It will educate students on various changes organism undergo during gradual transformation from birth to advanced stages of life. This course will explore the cellular and molecular mechanisms of calorie restriction and importance of evolutionary theories in understanding aging process.

PREREQ: BIOLOGY 120 OR BIOLOGY 141

BIOLOGY 251 INTRODUCTION TO GENETICS 4 Units

An introduction to the general principles of inheritance; subjects included are basic transmission genetics, molecular genetics, genetic engineering, mutations, and population genetics.

PREREQ: C OR BETTER IN (BIOLOGY 141 AND BIOLOGY 142 AND CHEM 102)

BIOLOGY 253 INTRODUCTION TO CELL BIOLOGY 3 Units

Introduction to the chemical and physical bases of life; bacterial and eukaryotic cell structure and function; cellular respiration; photosynthesis; and molecular biology. Three hours of lecture per week. Offered every semester.

PREREQ: BIOLOGY 142 WITH A GRADE OF C OR BETTER AND CHEM 102 WITH A GRADE OF C OR BETTER. COREQ: CHEM 104

BIOLOGY 254 BIOTECHNOLOGY LABORATORY METHODS I 2 Units

Introduction to theory and practice in modern molecular biology labs, including principles of nucleic acid isolation/quantitation/manipulation, photometry, centrifugation, electrophoresis, and assay methods. Exercises include basic lab methods and techniques, DNA analysis including cloning, polymerase chain reaction (PCR) restriction digests and RNA analysis. Three hours laboratory per week.

PREREQ: BIOLOGY 251 WITH A GRADE OF C OR BETTER AND CHEM 104 WITH A GRADE OF C OR BETTER

BIOLOGY 257 INTRODUCTION TO ECOLOGY 3 Units

A survey of ecosystems and animal and plant populations and communities. Topics include review of the Earth's major biomes and the physical factors that influence them, the ecology and evolution of populations, the nature of biotic communities, the structure and function of ecosystems, and the status and protection of biodiversity. Three hours of lecture per week. Optional field trip. Offered every semester.

PREREQ: BIOLOGY 141 AND BIOLOGY 142 WITH A GRADE OF C OR BETTER

BIOLOGY 258 ECOLOGICAL FIELD METHODS 2 Units

Introduction to regional terrestrial and aquatic biological communities and field techniques for studying these communities. Field work and lectures will focus on recognizing biotic community types, observing ecological interactions, and methods for identifying and surveying organisms.

PREREQ: C OR BETTER IN (BIOLOGY 141 AND BIOLOGY 142) COREQ: BIOLOGY 257

BIOLOGY 296 SPECIAL STUDIES *Repeatable* 1-3 Units

Variable topics. Group activity. Not offered regularly in the curriculum but offered on topics selected on the basis of timeliness, need, and interest, and generally in the format of regularly scheduled Catalog offerings. Repeatable for a maximum of 3 credits in major.

BIOLOGY 301 INTRODUCTION TO BEHAVIORAL NEUROSCIENCE 3 Units

A survey of the biological and physiological bases of human and animal behavior, with particular attention to the following: Basic principles of the anatomy, physiology, and biochemistry of the nervous system; sensory and motor systems; sleep; circadian rhythms; sexual behavior; emotion and stress; motivation; learning, memory, and language; neurological disorders; psychopathology.

PREREQ: PSYCH 211 OR 4 CREDITS IN BIOLOGY

BIOLOGY 303 BIostatISTICS 4 Units

Students will learn fundamentals of hypothesis formation and testing, using a variety of univariate statistical methods. Consideration of experimental design and the evaluation of research methodologies published in the biological literature are explored in detail. Students will gain practical experience with implementation of statistical analyses using real world datasets and communicating these results effectively.

PREREQ: BIOLOGY 141 AND BIOLOGY 142 WITH A GRADE OF C OR BETTER AND EITHER MATH 141 OR MATH 142 WITH A GRADE OF C OR BETTER

BIOLOGY 311 MICROBIOLOGY 4 Units

Examination of organisms too small to be seen by the unaided eye, ranging from their molecular organization to their role in global ecology. Primary emphasis will be the study of bacteria and viruses, their beneficial or detrimental impacts on humans, animals, and plants, and their current and potential exploitation.

PREREQ: C OR BETTER IN (BIOLOGY 251 AND BIOLOGY 253 AND CHEM 104)

BIOLOGY 312 INTERMEDIATE DATA SCIENCE 3 Units

This course introduces intermediate data science and its implementation using R and Python, with applications in natural and social science, public health and welfare, and other areas. Students will explore methods of data analysis, cleaning, simulation and visualization and machine learning. Prior knowledge of programming and statistical analysis is assumed.

PREREQ: ((COMPSCI 170 AND COMPSCI 180) OR (COMPSCI 220 OR COMPSCI 221 OR COMPSCI 222)) AND ONE COURSE IN STATISTICS (BIOLOGY 303 OR ECON 245 OR STAT 230 OR STAT 342 OR PSYCH 215 OR SOCIOLOGY 295 OR SOCWORK 250) OR INSTRUCTOR CONSENT

BIOLOGY 315 BIRDING IN SOUTHERN WISCONSIN 2 Units

An introduction to birding skills and the identification of the more than 200 bird species of southern Wisconsin. Early morning field trips are mandatory. Online lectures and learning activities alternate with outdoor field trips. Reliable computer and on-line access as well as a strong sense of self-discipline are required.

PREREQ: C OR BETTER IN A GL COURSE AND MINIMUM SOPHOMORE STANDING

BIOLOGY 340 COMPARATIVE VERTEBRATE ANATOMY 4 Units

Dissection and study of vertebrate types emphasizing characteristic structures, general relationships, comparative anatomy, and the significance of adaptation and evolution. Laboratory work, lectures and quizzes.

PREREQ: BIOLOGY 141 AND BIOLOGY 142 WITH A GRADE OF C OR BETTER OR EQUIVALENTS

BIOLOGY 341 DEVELOPMENTAL BIOLOGY 4 Units

Explores the processes of embryonic development in plants and animals, emphasizing the experimental basis of contemporary knowledge in embryogenesis, morphogenesis, and in cell and tissue differentiation. The laboratory illustrates principles and processes in early development and includes the use of basic microscopy and imaging techniques to study embryonic processes. Skills in observation, experimental design, and data presentation will be developed.

PREREQ: BIOLOGY 251 AND BIOLOGY 253 WITH A GRADE OF C OR BETTER OR EQUIVALENTS

BIOLOGY 345 ANIMAL PHYSIOLOGY 4 Units

A study of the functional mechanisms that underlie the life processes in animals. Six hours of laboratory and lecture per week.

PREREQ: C OR BETTER IN BIOLOGY 253

BIOLOGY 351 THE PLANT KINGDOM 4 Units

A study of the major groups of plants with emphasis on structure, reproduction, classification and evolution.

PREREQ: BIOLOGY 141 AND BIOLOGY 142 WITH A GRADE OF C OR BETTER OR EQUIVALENTS

BIOLOGY 353 PLANT TAXONOMY 4 Units

The principles of plant classification and identification, with emphasis on flowering plants of this region. Lectures, laboratories and field trips.

PREREQ: BIOLOGY 141 AND BIOLOGY 142 WITH A GRADE OF C OR BETTER OR CONSENT OF INSTRUCTOR

BIOLOGY 354 FIELD BOTANY 3 Units

A study of the identification and ecology of flowering plants, conifers and ferns. Emphasis will be given to the plants and plant communities in the vicinity of the course location. A collection of local plants is required of all students. Field trips required. Summer session only.

PREREQ: BIOLOGY 141 OR EQUIVALENT OR CONSENT OF INSTRUCTOR

BIOLOGY 357 CONSERVATION BIOLOGY 3 Units

This course explores the conceptual foundations of conservation biology. We will study the primary threats to biodiversity, and pay particular attention to issues of habitat degradation and loss, overexploitation, species invasions, and climate change. We will learn and apply skills, tools, and biological principles that are used by conservation biologists to study, track, manage, and mitigate environmental threats.

PREREQ: BIOLOGY 257 OR INSTRUCTOR CONSENT

BIOLOGY 359 AQUATIC PLANT BIOLOGY 4 Units

Survey of freshwater aquatic and wetland plant diversity, with an emphasis on angiosperms. Topics include plant identification, ecology, physiology, reproduction, and dispersal of aquatic plants. Economically important and invasive plant species will be discussed.

PREREQ: C OR BETTER IN (BIOLOGY 141 AND BIOLOGY 142)

BIOLOGY 361 HUMAN ANATOMY AND PHYSIOLOGY I 4 Units

A study of the structure and function of the human body at the level of organs and systems. This course covers the following topics: Anatomical Structure, Basic Histology, Bones, Muscles, and Nervous System. Three hours of lecture and three hours of laboratory per week.

PREREQ: BIOLOGY 120 WITH A GRADE OF C OR BETTER OR BIOLOGY 141 AND BIOLOGY 142 WITH A GRADE OF C OR BETTER OR CONSENT OF INSTRUCTOR

BIOLOGY 362 HUMAN ANATOMY AND PHYSIOLOGY II 4 Units

A study of the structure and function of the human body at the level of organs and systems. This is the second term course of a two term sequence. This course represents coverage of the following topics: Endocrinology, Circulatory System, Cardiac System, Lymphatic System, Respiration, Digestion and Metabolism, Renal, and Reproduction and Development. Three hours of lecture and three hours of laboratory per week.

PREREQ: BIOLOGY 361 WITH A GRADE OF C OR BETTER OR CONSENT OF INSTRUCTOR

BIOLOGY 363 MOLECULAR BIOLOGY 3 Units

The study of how nucleic acids and proteins interact to control the cell. Topics include DNA replication, chromosome structure, transcription, translation, control of gene expression, gene evolution and genomics. Experimental approaches to studying molecular biology are emphasized. Three hours of lecture per week.

PREREQ: BIOLOGY 251 AND BIOLOGY 253 WITH A GRADE OF C OR BETTER; COREQ: CHEM 251

BIOLOGY 364 BIOTECHNOLOGY LABORATORY METHODS II 2 Units

Advanced theory, techniques, and practices employed in modern molecular/cell biology labs. Concepts/techniques covered will include advanced lab and instrumentation skills, advanced microscopy, eukaryotic cell culture, protein analytical methods, and application of bioinformatics methodology.

PREREQ: C OR BETTER IN BIOLOGY 254 COREQ: BIOLOGY 363 (MAY BE COMPLETED PRIOR TO ENROLLMENT)

BIOLOGY 370 AQUATIC BIOLOGY 4 Units

The study of aquatic environments: fauna, flora and general ecology. The laboratory will emphasize the taxonomic study of aquatic organisms.

PREREQ: C OR BETTER IN (BIOLOGY 257 AND CHEM 102)

BIOLOGY 375 INVERTEBRATE ZOOLOGY 4 Units

A comprehensive study of the morphology, physiology, ecology and significance of the major groups of invertebrate animals. Six hours of laboratory and lecture per week.

PREREQ: BIOLOGY 141 AND BIOLOGY 142 WITH A GRADE OF C OR BETTER OR EQUIVALENTS

BIOLOGY 380 VERTEBRATE ZOOLOGY 3 Units

This course is a review of all extant vertebrate classes, including fish, amphibians, reptiles, birds, and mammals. It covers diversity, evolutionary history/relationships, taxonomy, morphology, identification, and ecology of these groups.

PREREQ: BIOLOGY 141 AND BIOLOGY 142, OR CONSENT OF INSTRUCTOR

BIOLOGY 412 IMMUNOLOGY 4 Units

Study of the function of cells and tissues of the vertebrate immune system. Topics include biology of critical molecules and cells, principles of innate, acquired, and adoptive immunity, immunogenetics, allergy, inflammation, autoimmunity, vaccines, and transplantation. The lab provides experience with modern serological and immunological laboratory techniques and instrumentation. Three hours of lecture and three hours of laboratory per week.

PREREQ: BIOLOGY 251 AND BIOLOGY 253 WITH A GRADE OF C OR BETTER OR EQUIVALENTS

BIOLOGY 416 ADVANCED AND MULTIVARIATE DATA ANALYSIS FOR THE LIFE SCIENCES 3 Units

An introduction to multifactorial and multivariate data analyses commonly used in life sciences such as psychology and biology. Analyses include analysis of variance and covariance, multiple analysis of variance and covariance, multiple regression, foundations of structural equation modeling (path analysis and latent factor analysis), discriminant analysis and logistic regression.

PREREQ: PSYCH 215 OR BIOLOGY 303 OR CONSENT OF INSTRUCTOR AND JUNIOR STANDING

BIOLOGY 425 APPLICATIONS OF CELLULAR BIOLOGY 3 Units

This course helps students build on and integrate the knowledge they have gained in Introductory Biology and Introduction to Cell Biology through reading and analysis of primary scientific literature. The course is organized such that students work in small groups to analyze a series of research papers to explore how a scientific research plan changes in response to new data.

PREREQ: C OR BETTER IN BIOLOGY 253

BIOLOGY 430 ANIMAL BEHAVIOR 4 Units

Behavior of animals as individuals and groups, including study of causation, development, integration, evolution and adaptive value of behavior patterns. Lecture and laboratory.

PREREQ: EITHER BIOLOGY 142 OR PSYCH 211, WITH A GRADE OF 'C' OR BETTER; AND A STATISTICS COURSE (BIOLOGY 303, PSYCH 215 OR STAT 230) WITH A GRADE OF C OR BETTER

BIOLOGY 442 ENVIRONMENTAL TOXICOLOGY 3 Units

This course is an introduction to environmental toxicology that focuses on sources, transport, fate, accumulation, and toxicity of contaminants. Principles of toxicity testing and analysis of effects at different levels of biological organization (molecular to ecosystem) are covered. Information on select classes of contaminants, including emerging contaminants of concern are presented.

PREREQ: CHEM 102 AND BIOLOGY 214 OR BIOLOGY 257 WITH A GRADE OF C OR BETTER

BIOLOGY 446 ORGANIC EVOLUTION 4 Units

History of evolutionary thought, evidences of evolution and analysis of evolutionary mechanisms and processes.

PREREQ: BIOLOGY 251 WITH A GRADE OF C OR BETTER AND EITHER (BIOLOGY 303, PSYCH 215, STAT 230, OR STAT 342) WITH A GRADE OF C OR BETTER.

BIOLOGY 448 BIOINFORMATICS 3 Units

Bioinformatics is an introduction to computer applications and algorithms currently used in the analysis of biological data, especially genomic and sequence data. The course entails lectures, discussions, readings and hands-on experience with bioinformatic software. Through exercises and individual research projects students acquire a working knowledge of contemporary computational methods and software.
PREREQ: BIOLOGY 141 WITH A GRADE OF C OR BETTER AND ONE OF THE FOLLOWING WITH A GRADE OF C OR BETTER: BIOLOGY 303, PSYCH 215, STAT 230, OR STAT 342

BIOLOGY 450 INTRODUCTORY ENTOMOLOGY 4 Units

An introduction to the biology and classification of insects. The course surveys insect structure, function, development, and evolution. Relevant insect physiology, ecology, and behavior are introduced. The laboratory surveys insect orders and a select group of Wisconsin families. An insect collection is required.

PREREQ: C OR BETTER IN (BIOLOGY 141 AND BIOLOGY 142)

BIOLOGY 456 BIOCHEMISTRY OF METABOLISM AND SIGNALING 3 Units

The chemistry of biological systems, focusing on metabolism and biochemical signaling. Three lectures/week. For Chemistry majors (Biochemistry emphasis), Biology majors (allied health focus) and students interested in Biochemistry postgraduate education.

PREREQ: (BIOLOGY 251 AND BIOLOGY 253 AND CHEM 251) OR (CHEM 251 AND CHEM 454) OR INSTRUCTOR CONSENT

BIOLOGY 457 WILDLIFE ECOLOGY 4 Units

Covers advanced ecological concepts related to wildlife. Topics include individual ecological needs, population biology, species interactions, and community-level impacts. In-depth look at quantitative and analytical aspects. Students will gain experiences in the application of concepts and methodologies in real-world settings, and learn more about analytical aspects of wildlife ecology. Provides the groundwork necessary for advanced studies or ecological research.

PREREQ: A GRADE OF C OR BETTER IN ALL OF THE FOLLOWING: BIOLOGY 251; BIOLOGY 257; BIOLOGY 258; BIOLOGY 303 OR PSYCH 215

BIOLOGY 458 ADVANCED BIOCHEMISTRY LABORATORY 2 Units

A laboratory course that teaches biochemical research techniques through guided original research projects.

PREREQ: BIOLOGY 141 AND CHEM 251 COREQ: PRIOR COMPLETION OR CONCURRENT ENROLLMENT IN (CHEM 454 OR BIOLOGY 456 OR CHEM 456)

BIOLOGY 459 COMMUNITY ECOLOGY 4 Units

Upper level ecology course which takes quantitative approaches to learning how organisms interact in communities and their natural ecosystems. This class concentrates on defining communities and exploring how different communities are maintained and/or modified with changing conditions. Topics include: community metrics, niche theory, organism interactions (competition, predator-prey relationships, mutualism, and commensalism), food web ecology, spatial ecology, and succession.

PREREQ: BIOLOGY 257 AND BIOLOGY 258 (BIOLOGY 303 OR PSYCH 215), ALL WITH A GRADE OF C OR BETTER

BIOLOGY 490 WORKSHOP Repeatable 1-3 Units

This course provides teaching experience at the college level for undergraduate students. Undergraduate teaching experience students will assist faculty members in preparing, delivering, and tearing down laboratory or discussion section instructional units in biology courses, conducting review sessions, and tutoring students under the direct supervision of a faculty mentor. S/NC only.

BIOLOGY 491 TRAVEL STUDY Repeatable 1-3 Units

Variable topics. Faculty-led field courses.

BIOLOGY 492 LABORATORY TEACHING EXPERIENCE Repeatable 1 Units

This course provides teaching experience at the college level for undergraduate students. Undergraduate teaching experience students will assist faculty members in preparing, delivering, and tearing down laboratory or discussion section instructional units in biology courses, conducting review sessions, and tutoring students under the direct supervision of a faculty mentor. S/NC only.

BIOLOGY 493 INTERNSHIP IN BIOLOGY Repeatable 1-3 Units

Variable topics. Students will learn skills related to their major or career goals through hours spent shadowing or working in a biology-related business, non-profit, etc. Students should apply for internship credit through the biology department webpage.

BIOLOGY 494 SEMINAR Repeatable 1 Units

Variable topics. Group activity. An advanced course of study in a defined subject matter area emphasizing a small group in intense study with a faculty member. Repeatable two times for a maximum of 2 credits in degree.

PREREQ: 16 HRS OF BIOLOGY INCLUDING BIOLOGY 141 AND BIOLOGY 142

BIOLOGY 496 SPECIAL STUDIES Repeatable 1-3 Units

Variable topics. Group activity. Not offered regularly in the curriculum but offered on topics selected on the basis of timeliness, need, and interest, and generally in the format of regularly scheduled Catalog offerings. Repeatable for a maximum of 3 credits in major.

BIOLOGY 497 EXCHANGE STUDY Repeatable 1-99 Units

Variable topics.

EQUIVALENTS: BIOLOGY 497/BIOLOGY 497L

BIOLOGY 497L EXCHANGE STUDY Repeatable 72 Units

EQUIVALENTS: BIOLOGY 497/BIOLOGY 497L

BIOLOGY 498 INDEPENDENT STUDY Repeatable 1-3 Units

Typical projects may include helping researchers in conducting research projects or helping instructors develop pedagogical tools for their courses. Eligible students who are conducting their own research projects should enroll in Biology 498R. Repeatable for a maximum of 6 credits in major and degree or 2 units in the minor.

PREREQ: BIOLOGY 141 AND BIOLOGY 142 AND 2.00 GPA IN BIOLOGY AND INSTRUCTOR CONSENT

BIOLOGY 498R INDEPENDENT STUDY - UNDERGRADUATE RESEARCH Repeatable 1-3 Units

Students will complete and present an undergraduate research project under the direction of a faculty mentor. Projects may require more than one semester to complete. Repeatable for a maximum of 6 units in major and degree or 2 in the minor.

PREREQ: BIOLOGY 141 AND BIOLOGY 142 AND 2.00 GPA IN BIOLOGY AND INSTRUCTOR CONSENT

BIOLOGY 499 BIOLOGY THESIS Repeatable 2-3 Units

A substantial research project written as a thesis. Two credits are taken in the first semester and three in the second semester. A proposal must be submitted at the midpoint of the first term and an oral defense takes place at the end of the second term.