

# BIOLOGY (BIO)

## **BIO 103** STRUCT & FUNC OF HUMAN BODY 4 Credit

An introductory course for non-science majors emphasizing human biology. Areas of study include the chemical and cellular basis for life and the major organ systems of the body (the skin, skeletal, muscular, cardiovascular, digestive, respiratory, reproductive, urinary, immune, nervous, and endocrine systems.)

**Co-requisite(s):** BIO 103L

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Attributes:** Fulfills ELA Exper. Science

**Course Offerings:** Hybrid, Lecture, Web Based

## **BIO 103L** STRUCT & FUNC OF HMN BODY LAB 0 Credit

**Co-requisite(s):** BIO 103

**Grade Mode:** Credit/No Credit

**Course Offerings:** Lab, Hybrid

## **BIO 107** MEDICAL TERMINOLOGY 2 Credit

The study of medical terminology introduces students to the language of medicine. Students will gain an understanding of basic elements, rules of building and analyzing medical words, and medical terms associated with the human body. Utilizing a systems-approach, the student will define, interpret, and pronounce medical terms relating to structure and function, pathology, diagnosis, clinical procedures, and pharmacology. In addition to medical terms, common abbreviations applicable to each system will be interpreted.

**Grade Mode:** Standard Letter

**Course Offerings:** Hybrid, Lecture, Web Based

## **BIO 110** THE LIVING ENVIRONMENT 4 Credit

All living things share certain characteristics and requirements. Though non-living things may exhibit one or more of these characteristics, living things exhibit them all. This course will give students deeper insight and appreciation of how fundamental science concepts are used in emerging research and discoveries in the life laboratory and science process skills are developed through hands-on activities and discussion contributions. Students will gain an understanding of science as a way to serve human needs and solve human problems. Expect to be offered: Fall Semesters Distance Learning: Spring Semester, even years

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Attributes:** Fulfills ELA Exper. Science

**Course Offerings:** Hybrid, Web Based

**Equivalencies:** BIO 110ES

## **BIO 111** ENVIRONMENTAL GEOLOGY 4 Credit

An examination of both the controls of human activities by geology and the impact of humans on natural geologic processes; a survey of fundamental geologic processes and associated hazards (earthquakes, volcanoes, floods, etc.); the use and conservation of geologic resources (energy, minerals, water, soil); and topics such as pollution, waste disposal and land-use planning. An opportunity will be given to discuss, from a geologic perspective, ramifications of and potential solutions to problems associated with Earth's resources.

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

## **BIO 112** FIELD ECOLOGY 4 Credit

Relationships of plants and animals to their environment in the field, with emphasis upon habitat adaptation, the ecosystem, community structure, and ecological succession in the western part of North America.

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

## **BIO 115** ENVIRONMENTAL ECOLOGY 4 Credit

An interdisciplinary study for both science and non-science majors interested in the interconnection between human society and the natural world as they have developed over time. Based on an understanding of ecological concepts and principles, students examine lifestyle issues and critically analyze the relationship among populations, natural resources, land use, agriculture, biodiversity, industrialization and pollution. Environmental problems are examined from scientific, ethical, economic and sociological perspectives to enable students to understand the relevance of biology to contemporary issues in human society. Expected to be offered: Spring semesters Distance Learning: Fall semester, Even years

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Attributes:** Fulfills ELA Exper. Science

**Course Offerings:** Hybrid, Web Based

**Equivalencies:** BIO 115ES

## **BIO 151** GENERAL BIOLOGY I 4 Credit

Foundational course designed to prepare students for upper division courses in any of the life sciences. This course introduces the chemical context of life and emphasizes fundamental life processes at the cellular level, including metabolism, cellular respiration, and photosynthesis. Other topics covered are mechanisms of evolution and the evolutionary history of biological diversity. Accompanying laboratory experience utilizes research processes and their subsequent application to real world problems.

**Co-requisite(s):** BIO 151L

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Attributes:** Fulfills ELA Exper. Science

**Course Offerings:** Hybrid, Lecture, Web Based

## **BIO 151L** GENERAL BIOLOGY I LAB 0 Credit

**Co-requisite(s):** BIO 151

**Grade Mode:** Credit/No Credit

**Course Offerings:** Lab, Hybrid

## **BIO 152** GENERAL BIOLOGY II 4 Credit

A continuation of BIO 151, this course completes the discussion of fundamental cellular processes with DNA replication, translation, cell division, and chromosomal inheritance. Other topic emphasis includes the study of populations, ecosystems, plant, as well as animal form and function. Accompanying laboratory experience utilizes research processes and their subsequent application to real world problems.

**Pre-requisite:** BIO 151

**Co-requisite(s):** BIO 152L

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

## **BIO 152L** GENERAL BIOLOGY II LAB 0 Credit

**Co-requisite(s):** BIO 152

**Grade Mode:** Pass/Fail

**Course Offerings:** Lab, Hybrid

## **BIO 190** FRESHMAN SCIENCE SEMINAR 1 Credit

Science seminar is an introduction in how to succeed in science, how to initiate a research project, and how to get through the first two years of a science program. Freshman or sophomores will learn skills needed to succeed in science. Students will identify future goals, career objectives and put together a plan for graduation

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

## **BIO 192** SPECIAL PROBLEMS IN BIOLOGY 1-3 Credit

**Grade Mode:** Standard Letter, Audit, Pass/Fail, Transfer

**Course Offerings:** Lecture, Web Based

**BIO 200 ECOLOGY 4 Credit**

Ecology integrates much of what you have learned in previous biology courses while focusing on higher levels of organization (populations, communities and ecosystems). This initial course will present classical and contemporary theories of the ecological relationships applicable to plants and animals. Emphasis will fall on terminology and conceptual development, observations and experiments, and current directions. Current field and lab techniques along with statistical and mathematical approaches to data analysis will be included.

**Pre-requisite:** BIO 151

**Co-requisite(s):** BIO 200L

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 200L ECOLOGY LAB 0 Credit**

**Co-requisite(s):** BIO 200

**Grade Mode:** Credit/No Credit

**Course Offerings:** Lab, Hybrid

**BIO 208 MICROBIOLOGY FOR HL SCI W/ LAB 4 Credit**

This course covers basic microbiology and immunology. It provides an introduction to historical concepts of the nature of microorganisms, microbial diversity, the importance of microorganisms and acellular agents in the biosphere, and their roles in human and animal diseases. Major topics include bacterial structure as well as growth, physiology, genetics, and biochemistry of microorganisms. Emphasis is on medical microbiology, infectious diseases, and public health. The laboratory exercises for this course include microbial diversity, microbial cell biology, microbial genetics, interactions and impact of microorganisms and humans, and microorganisms and human disease.

**Pre-requisite:** BIO 251

**Grade Mode:** Standard Letter

**Course Offerings:** Hybrid, Web Based

**BIO 211 ZOOLOGY 4 Credit**

Principles of zoology; comparative study of structure & function in animals. Topics discussed: reproduction, development, heredity, ecology, & a survey of the animal kingdom.

**Pre-requisite:** BIO 151

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Web Based

**BIO 212 GENERAL BOTANY 4 Credit**

General principles of botany; structure & function in plants; reproduction; heredity; ecology; economic botany; & a survey of the plant kingdom. Laboratory experiments & microscopic studies coordinated with lecture.

**Pre-requisite:** BIO 152

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Web Based

**BIO 221 CELL AND MOLECULAR BIOLOGY 4 Credit**

This course will provide an introduction to cell biology and will cover the following topics: cell chemistry, macromolecules, transcription, translation, cell architecture, metabolism, signal transduction pathways, cell division, and the cell cycle. This course will focus on methods of inquiry, collection and analysis of data, and interpretation and presentation of results. Students will also learn current molecular biology techniques that are used to study these topics in the laboratory.

**Pre-requisite:** BIO 152, CHM 111, CHM 112

**Co-requisite(s):** BIO 221L

**Grade Mode:** Standard Letter

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 221L CELL AND MOLECULAR BIOLOGY LAB 0 Credit**

**Co-requisite(s):** BIO 221

**Grade Mode:** Credit/No Credit, Pass/Fail

**Course Offerings:** Lab, Hybrid

**BIO 251 HUMAN ANATOMY & PHYSIOLOGY I 4 Credit**

A study of the anatomy & physiology of the human body & its relationship to human function. The examination of integumentary, skeletal, muscular, nervous, & endocrine systems include the use of a human cadaver in the laboratory setting.

**Pre-requisite:** BIO 151, BIO 110, BIO 110ES, BIO 103, CHM 102

**Co-requisite(s):** BIO 251L

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 251L HUMAN ANAT/PHYS I LAB 0 Credit**

**Co-requisite(s):** BIO 251

**Grade Mode:** Credit/No Credit

**Course Offerings:** Lab, Hybrid

**BIO 252 HUMAN ANATOMY & PHYSIOLOGY II 4 Credit**

A continuation of BIO 251, this course is a study of anatomy & physiology. Systems covered include cardiovascular, lymphatic/immune, respiratory, digestive, urinary, & reproductive systems. A human cadaver & iWorx physiology software are utilized in the laboratory setting.

**Pre-requisite:** BIO 251

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 252L HUMAN ANATOMY & PHYS II LAB 0 Credit**

**Grade Mode:** Pass/Fail, Credit/No Credit

**Course Offerings:** Lab, Hybrid

**BIO 271 BASIC AND CLINICAL NUTRITION 3 Credit**

Study of the basic concepts of human nutrition as they relate to the health and well being of the individual. Included are studies of the nutritional needs of the body, digestion and metabolic processes, dietary trends, recommended daily allowances, vitamin supplementation, nutritional diseases, and nutrition of the elderly. expect to be offered: Spring Semesters

**Pre-requisite:** BIO 103, BIO 251

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 290 SOPHOMORE SCIENCE SEMINAR 1 Credit**

This science seminar course is the second in a series of four. Students will learn skills needed to succeed in science through exploration of research opportunities, developing a research project, and ultimately finding funding for their research.

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 292 SPECIAL TOPICS IN BIOLOGY 1-6 Credit**

**Grade Mode:** Standard Letter, Audit, Pass/Fail, Transfer

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 302 ORNITHOLOGY 4 Credit**

Welcome to the study of avian biology! Ornithology is an upper level biology course with a full lab complement that will build on knowledge obtained in introductory biology courses. The lecture component of this course offers a survey of the evolution, morphology, behavior, and reproductive biology of birds (Class Aves). It will then expand their knowledge with an in-depth study of the biology of birds, including avian form and function, behavior and migration. Students will discuss the roles of birds in ecosystems and the importance of conservation efforts to preserve habitats. Students will learn to identify birds by characteristics such as size, shape, color, marking, flight patterns, habitat and behavior. Students will gain skills in field identification, and will be expected to learn the taxonomy and natural history of the avifauna of Montana. Labs will include study of

**Pre-requisite:** BIO 211, ENG 117

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Web Based

**BIO 304 MAMMALOLOGY 4 Credit**

A study of mammals with emphasis on principles of mammalian ecology, conservation, biodiversity, techniques of field study, and methods of collection and preservation. The lecture portion of the course has two primary objectives: (a) the understanding of the Class Mammalia, accomplished primarily through lectures and discussions focusing on mammal structure and function, diversity, ecology, behavior, and biogeography; and (b) an introduction to taxonomic groups designed to complement the laboratory. We will use the textbook, lecture, and primary literature to discuss a topic each week. The laboratory portion of the course will focus on mammalian diversity through the study of museum material, slides, video, and literature. Efforts will be made to cover mammals of Montana, North America, exotic mammals popular in zoos, as well as interesting mammals from around the world.

**Pre-requisite:** BIO 211, ENG 117

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Web Based

**BIO 311 GENETICS 4 Credit**

This upper-division course for majors covers the fundamentals of classical & molecular genetics, including gene structure, function, & transmission in prokaryotes, eukaryotes, & viruses. Methods of genetic manipulation & statistical analysis will be considered in a problem-solving context.

**Pre-requisite:** ENG 117, BIO 221

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 311L GENETICS LAB 0 Credit**

**Grade Mode:** Pass/Fail, Credit/No Credit

**Course Offerings:** Lab, Hybrid

**BIO 320 AQUATIC ECOLOGY 4 Credit**

This course is devoted to the major questions, approaches, applications and tools of modern freshwater ecology. With its primary focus on freshwater ecosystems, this course will cover important issues in aquatic ecology. This course will cover basic ecological theory, methodology, and issues such as global warming, surface and groundwater quality, dams and water diversion. Students will acquire the necessary knowledge and tools to assess the quality and ecological status of freshwater bodies and select specific management options.

**Pre-requisite:** BIO 200, ENG 117

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 380 MICROBIOLOGY 4 Credit**

Study of bacteria, viruses, fungi. Discussion of the form, metabolism, reproduction, physiology, & methods of classification of microscopic organisms, their relationships to each other, & their effects on humans.

**Pre-requisite:** BIO 221, ENG 117

**Co-requisite(s):** BIO 380L

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 380L MICROBIOLOGY LAB 0 Credit**

**Co-requisite(s):** BIO 380

**Grade Mode:** Credit/No Credit

**Course Offerings:** Lab, Hybrid

**BIO 390 JUNIOR SCIENCE SEMINAR 1 Credit**

Junior Science seminar is a continuation of Science Seminary I for juniors and seniors. Students will use this class to compile their portfolio for subsequent career opportunities. They will discover the who, what, when, where and how of the graduate or professional school application process in their chosen field. Students will continue their research and writing towards the completion of their Senior Thesis. Finally, students will mentor freshman and sophomore science majors.

**Pre-requisite:** ENG 117

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 392 SPECIAL TOPICS: 1-6 Credit**

Expected to be offered: Sufficient demand

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 400 IMMUNOLOGY 4 Credit**

This upper division elective course for biology majors discusses the science of "self/non-self" discrimination. Examination of physiological functions of immune response, including cell & antibody mediated immunity, allergic & hypersensitive reactions, surveillance mechanisms, & inborn & acquired immune responses. Clinical & laboratory applications of immunologic function will be covered such as transplantation, modulation, immune deficiencies, & disease states.

**Pre-requisite:** BIO 221, ENG 117

**Co-requisite(s):** BIO 400L

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 400L IMMUNOLOGY LAB 0 Credit**

**Co-requisite(s):** BIO 400

**Grade Mode:** Pass/Fail

**Course Offerings:** Lab, Hybrid

**BIO 405 DEVELOPMENTAL BIOLOGY 4 Credit**

This upper division elective for biology majors discusses the genetic mechanisms underlying the formation of organisms from a single cell. Molecular & cellular influences on the differentiation & development of cells, tissues & organs, will be used as a basis for the morphological changes that are found in the developing organism as a whole.

**Pre-requisite:** BIO 221, ENG 117

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 405L DEVELOPMENTAL BIOLOGY LAB 0 Credit**

**Grade Mode:** Pass/Fail

**Course Offerings:** Lab, Hybrid

**BIO 411 CELL BIOLOGY 4 Credit**

This upper-division elective for biology majors offers an in-depth look at cellular structure & function. Students examine the role of organelles, biological membranes, the cytoskeleton, & extra-cellular matrix in the processes of organelle biosynthesis, vesicle transport, protein targeting, molecular motors, & secretion.

**Pre-requisite:** BIO 221, ENG 117

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 411L CELL BIOLOGY LAB 0 Credit**

**Co-requisite(s):** BIO 411

**Grade Mode:** Credit/No Credit

**Course Offerings:** Lab, Hybrid

**BIO 420 VIROLOGY 4 Credit**

This upper division elective course for biology majors explores current concepts in the field of virology. The structure & genetic composition of viruses as well as strategies for the replication & expression of viral genetic material will be examined. Mechanisms of viral pathogenesis will be presented.

**Pre-requisite:** BIO 221, ENG 117

**Co-requisite(s):** BIO 420L

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Lecture, Web Based

**BIO 420L VIROLOGY LAB 0 Credit**

**Grade Mode:** Credit/No Credit

**Course Offerings:** Lab, Hybrid

**BIO 422 CONSERVATION ECOLOGY 4 Credit**

Human activities are having a cumulative effect on the natural systems upon which life depends. Future land management impacts will likely entail unprecedented change in environmental conditions. More integration of the traditional natural resources fields will be required to develop innovative approaches to sustain resource development. Conservation Ecology provides insights to the many benefits and services that nature offers and explores strategies for management options to sustain ecological integrity and the production of goods and services. It is an emerging interdisciplinary approach to harmonizing the interactions between people and nature at ecosystem scales. The course is designed to explore the knowledge, theories, and research related to the total environment in which we practice conservation. Emphasis will be on the synthesis and integration of knowledge, skills and abilities that are needed as conservation issues become more complex. A problem-based learning format will require students to actively participate in their own learning by researching and analyzing real-life problems to arrive at "best" solutions.

**Pre-requisite:** BIO 200, ENG 117

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** Hybrid, Web Based

**BIO 490 RESEARCH IN BIOLOGY 1-4 Credit**

Research experience for Biology majors. This student initiated undergraduate research project aims to develop abilities for asking sound research questions, designing reasonable scientific approaches to answer such questions, & performing experiments to test both the design difficulties & limitations in experimental strategies due to design, equipment, organism selected, etc.

**Pre-requisite:** ENG 117

**Grade Mode:** Other to Include Option of IP, Pass/Fail

**Course Offerings:** IN/FE/Rsrch/Thsis/Prjct/Capstn, Research

**BIO 495 INTERNSHIP 1-15 Credit**

Expected to be offered: Sufficient demand

**Pre-requisite:** ENG 117

**Grade Mode:** Standard Letter, Audit, Pass/Fail

**Course Offerings:** IN/FE/Rsrch/Thsis/Prjct/Capstn

**BIO 499 SENIOR THESIS 1 Credit**

This upper division course for biology majors requires submission of a written report (thesis) & oral seminar presentation based on critical evaluation of scientific literature and/or an independent research project.

**Pre-requisite:** ENG 117

**Restrictions:** Enrollment limited to students with a classification of Senior

**Grade Mode:** Other to Include Option of IP, Audit, Pass/Fail, Standard Letter

**Course Offerings:** Senior Project/Research, IN/FE/Rsrch/Thsis/Prjct/Capstn