

UNDERGRADUATE COURSES OF STUDY

BIOLOGY

BIOL 101.GENERAL BIOLOGY

This laboratory science course provides non-majors with an introduction to the foundational themes of biology. Topics include scientific inquiry, cellular processes, reproduction, genetics, evolution, ecology, and conservation biology. This course cannot be used to satisfy the requirements for the biology major or biology minor. Three hours lecture, three hours laboratory weekly. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours.***

BIOL 102.ORGANISMAL BIOLOGY

This laboratory science course provides non-majors with a survey of biological diversity. Students will examine the major groups of prokaryotes, protists, plants, fungi, and animals in both classroom and field settings. Form and function, ecology, and evolutionary relationships are emphasized. This course cannot be used to satisfy the requirements for the biology major or biology minor. Three hours lecture, three hours laboratory weekly. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours.***

BIOL 103.PLANTS AND PEOPLE

This is a survey course that examines the interdependence of humans and plants. Emphasis is placed on the aspects of plant biology that supply humans with food, medicine, clothing, shelter, and material goods as well as those that produce stimulating, intoxicating, or harmful effects. Students will learn basic principles of plant taxonomy, structure, physiology, genetics, and defense, as well as the history of plant use by humans. This course cannot be used to satisfy the requirements for the biology major or biology minor. Three hours lecture, three hours laboratory weekly. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours.***

BIOL 111.FOUNDATIONS IN ECOLOGY, EVOLUTION, AND GENETICS

One-half of a two-semester introduction to biology designed to prepare science majors for further study in scientific and medical fields. Topics include the scientific method and biological inquiry, genetics, ecology, evolution, and the history of life. Three hours lecture, three hours laboratory weekly. Prerequisite or co-requisite: MATH 121, MATH 123, or MATH 141. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours***

BIOL 112.FOUNDATIONS IN CELLULAR AND MOLECULAR BIOLOGY

One-half of a two-semester introduction to biology designed to prepare science majors for further study in scientific and medical fields. Topics include the scientific method and biological inquiry, cell structure, metabolism, the cell cycle, and inheritance. Prerequisite: a grade of “C” or better in BIOL 111, BIOM 111, or CHEM 111. Three hours lecture, three hours laboratory weekly. (General Education – Scientific and Mathematical Reasoning) ***Four credit hours.***

BIOL 202.HUMAN ANATOMY

Each organ system of the human body is studied. Both gross and microscopic anatomy are covered, with emphasis placed on the relationship between structure and function. No prerequisite. Three lecture hours and three laboratory hours weekly. ***Four credit hours.***

BIOL 203.HUMAN PHYSIOLOGY

This course uses an organ system approach. The normal functions of each organ system are covered with a strong emphasis on functions at the cellular level as well as the organ level. A strong chemistry background is essential for the successful completion of this course. Prerequisites: “C” or better in BIOL 202; or “C” or better in BIOL 112 and either BIOL 111 or BIOM 111. Three hours lecture and three hours laboratory weekly. ***Four credit hours.***

BIOL 204.MICROBIOLOGY

This course is a study of microorganisms with emphasis placed on those directly related to health problems, with special references to epidemiology and diagnostic procedures. Three hours lecture and three hours laboratory weekly. Prerequisites: “C” or better in BIOL 202 and BIOL 203; or a grade of “C” or better in BIOL 112 and either BIOL 111 or BIOM 111. ***Four credit hours.***

BIOL 213.BOTANY

This course covers evolution, diversity, reproduction, development, structure, and function of the Plantae. Three hours lecture, three hours laboratory weekly. Prerequisite: "C" or better in BIOL 111 or BIOM 111. ***Four credit hours.***

BIOL 214.ZOOLOGY

This course provides a survey of invertebrate and vertebrate animals covering their diversity, morphology, behavior, and evolution. Three hours lecture, three hours laboratory weekly. Prerequisites: "C" or better in BIOL 112 and either BIOL 111 or BIOM 111. ***Four credit hours.***

BIOL 254.MICROBIOLOGY FOR HEALTHCARE

This course is for non-science majors interested in a health-related profession. The course is a study of microorganisms with emphasis placed on those directly related to health problems, with special references to epidemiology and diagnostic procedures. This course is for online RN to BSN and online Public Health majors only. Three hours lecture weekly. Prerequisites: "C" or better in both BIOL 202 and BIOL 203. ***Three credit hours.***

BIOL 270.SPECIAL TOPICS IN BIOLOGY

Designed to provide students with a broader knowledge and understanding of biology, this course will involve the study of topics not currently included, or not covered in depth, in the regular curriculum. Possible formats include (but are not limited to) seminar, field study, laboratory study, lecture, or a combination of these, depending on the topic covered. May be taken for additional credit as topic changes. Prerequisite: Instructor permission. ***One to four credit hours.***

BIOL 299.SOPHOMORE SEMINAR IN BIOLOGY

The first in a series of three required academic and professional development courses, this offering will include instruction and active learning in the following areas: careers in biology and admissions requirements for graduate and professional schools, bioethics, plagiarism, finding reputable sources of scientific information, and communication skills pertaining to the sciences. Prerequisite: "C" or better in BIOL 112 and either BIOL 111 or BIOM 111. ***One credit hour.***

BIOL 303.EVOLUTION

This course introduces students to the principles of evolutionary biology through discussion and lecture. Topics include the history of evolutionary biology, mechanisms of evolution, population genetics, history of life, relationships between speciation and extinction, basic phylogenetic methods, coevolution, and human evolution. Three hours lecture weekly. Prerequisites: "C" or better in BIOL 112 and either BIOL 111 or BIOM 111. ***Three credit hours.***

BIOL 304.PATHOPHYSIOLOGY

A study of the underlying principles of physiologic dysfunction; to include circulatory, metabolic, immune, and endocrine disturbances, degenerative processes, genetic disorders, the inflammatory process, and neoplasia. Three hours lecture. Prerequisite: "C" or better is BIOL 203. ***Three credit hours.***

BIOL 306.ECOLOGY

This course is a study of the relationships between organisms and their environment. Topics will include population dynamics, community interactions, and ecosystem processes. Laboratory and field exercises provide experience with experimental design in ecology as well as data analysis and interpretation. Three hours lecture, three hours laboratory weekly. Prerequisites: MATH 211, "C" or better in BIOL 111 or BIOM 111, and "C" or better for either BIOL 213, BIOL 214, BIOL 303, or GEOL 111. ***Four credit hours.***

BIOL 307.ANIMAL DEVELOPMENT

This course is a study of animal development and embryogenesis in both vertebrate and invertebrate model systems. Emphasis is placed upon the cellular, molecular, and genetic mechanisms underlying differentiation, morphogenesis, and developmental pattern formation. Three hours lecture, three hours laboratory weekly. Prerequisite: "C" or better in BIOL 312. ***Four credit hours.***

BIOL 308.COMPARATIVE VERTEBRATE ANATOMY

This course is an in-depth comparative survey of the organ systems of vertebrate animals with emphasis on phylogeny and functional morphology. Three hours lecture, three hours laboratory weekly. Prerequisite: "C" or better in BIOL 214. ***Four credit hours.***

BIOL 311.ANIMAL PHYSIOLOGY

This course stresses the physical and chemical bases underlying physiological functions and regulatory processes in the organ systems of vertebrates. Three hours lecture, three hours laboratory weekly. Prerequisite: "C" or better in BIOL 112, and either BIOL 299 or BIOM 299. *Four credit hours.*

BIOL 312.GENETICS

This course is an introduction to both transmission and molecular genetics. Topics include classical Mendelian genetics, gene interaction, basic genetic mapping, and major molecular processes in prokaryotic systems. The laboratory focuses on developing skills using common molecular techniques, and the collection and analysis of experimental data in multiple genetic model systems. Three hours lecture, three hours laboratory weekly. Prerequisites: CHEM 221 and "C" or better in BIOL 112. *Four credit hours.*

BIOL 313.PLANT ANATOMY

This course is a study of the structure and development of vascular plant cells, tissues, and organs. Emphasis is placed on the relationships between structure and function as well as the evolutionary origins of major plant structures. Three hours lecture, three hours laboratory weekly. Prerequisite: "C" or better in BIOL 303. *Four credit hours.*

BIOL 321.FOUNDATIONS OF MEDICINE

This course reviews and helps the student organize the foundational concepts needed to enter medical school. 1. Knowledge of scientific concepts and principles. 2. Scientific reasoning and problem solving. 3. Reasoning about the design and execution of research. 4. Data-based and statistical reasoning. Students will be required to take two practice MCAT exams, one near the beginning of the course and one near the end of the course, to evaluate their understanding of the foundational concepts. Because these exams range from six to eight hours, these will generally be scheduled on a Saturday or Sunday. Prerequisites: "C" or better in CHEM 221 and PHYS 201 and instructor permission. *Three credit hours.*

BIOL 365.EXPERIMENTAL DESIGN

This course provides experience in designing scientific experiments by devising research questions; organizing and analyzing data using the R programming language; and presenting research results in effective ways. Student research projects form the core of the laboratory sessions, which will emphasize the planning of experiments, collection of data, and the necessity of the revision process in creating successful presentations. Three hours lecture, three hours laboratory weekly. This course cannot be used to satisfy biology elective requirements for the biology major or biology minor. Prerequisites: MATH 211 or instructor permission. *Four credit hours.*

BIOL 399.JUNIOR SEMINAR IN BIOLOGY

The second in a series of three required academic and professional development courses, this offering is designed to improve student facility in sourcing, interpreting, critiquing, summarizing, and presenting biological information from the primary literature. Additional goals include guiding students in preparation for graduate and professional school exams and the assembly of their academic portfolios. Prerequisite: "C" or better in BIOL 299 and "C" or better for either BIOL 213, BIOL 214, or BIOL 303. *One credit hour.*

BIOL 401.CELL BIOLOGY

A study of the structure, function, and organization of cells, including subcellular compartmentalization, membrane systems, protein targeting, cell transport, energetics, the cytoskeleton, cell motility, the extracellular matrix, regulation of the cell division cycle, signal transduction and cell-cell interactions. Three hours lecture, three hours laboratory weekly. Prerequisites: CHEM 221, "C" or better in BIOL 112 and 312. *Four credit hours.*

BIOL 403. MOLECULAR BIOLOGY

This course is a study of the structure, organization, and regulation of genetic material. Emphasis is placed on the molecular and biochemical regulation of genome replication, gene expression, and on the molecular techniques used in DNA manipulation. Three hours lecture, three hours laboratory weekly. Prerequisites: CHEM 221 and BIOL 312. *Four credit hours.*

BIOL 406, 407, 408, 409, 410.BIOLOGY RESEARCH

This course involves directed laboratory or field research in biology. Students will be responsible for writing a research proposal; designing experiments; collecting, analyzing, and interpreting data; and communicating their findings to the biology faculty. This course may be repeated for additional credit up to a maximum of four credit hours. Prerequisite: "C" or better in BIOL 111 or BIOM 111. *Zero to four credit hours.*

BIOL 412.GENETICS RESEARCH

This course involves directed laboratory research in genetics. Projects are expected to be of sufficient depth and breadth to encompass a minimum of two semesters of laboratory research. Students will register for credit during their final semester of research. A public seminar on research results must be presented during the semester in which course credit is granted. Prerequisite: "C" or better in BIOL 312. *Four credit hours.*

BIOL 415.LIMNOLOGY

This course is a study of the biological, physical, and chemical characteristics of freshwater systems. Emphasis will be placed on the ecology of lakes, streams, and rivers. Laboratory exercises provide experience with experimental design and data analysis through investigations of limnological concepts in field and laboratory settings. Three hours lecture, three hours laboratory weekly. Prerequisites: MATH 211 and a grade of "C" in either BIOL 303 or BIOL 306. *Four credit hours.*

BIOL 421.GENERAL MICROBIOLOGY

Using examples from bacteria, protozoa, fungi, and viruses, the following concepts will be emphasized: evolution, microbial structures and functions, metabolic diversity, microbial genetics, interactions within systems, impact of microbes on the environment and humans, and microbial control. Laboratory skills in manipulating, culturing, enumerating, and identifying microbes will also be emphasized. Three hours lecture, three hours laboratory weekly. Prerequisites: CHEM 221 and "C" or better in BIOL 312. *Four credit hours.*

BIOL 422.IMMUNOLOGY AND SEROLOGY

This course is an introduction to the following concepts: evolution and the structures and functions of the mammalian immune system, genetic and molecular mechanisms of diverse immune responses, and coordination of immune responses and their dysfunction. Laboratory skills include performing fundamental immunological and serological techniques. Three hours lecture, three hours laboratory weekly. Prerequisites: CHEM 221, "C" or better in BIOL 299 and BIOL 303, or instructor permission. *Four credit hours.*

BIOL 470.SPECIAL TOPICS IN BIOLOGY

Designed to provide students with a broader knowledge and understanding of biology, this course will involve detailed study of advanced topics not currently included, or not covered in depth, in the regular curriculum. Possible formats include (but are not limited to) seminar, field study, laboratory study, lecture, or a combination of these, depending on the topic covered. May be taken for additional credit as topic changes. Prerequisite: Instructor permission. *One to four credit hours.*

BIOL 490.BIOLOGY INTERNSHIP

This course involves practical experience in an approved biology-related work situation. The experience will be supervised by a site supervisor as well as a member of the Biology faculty, who will make at least one visit to the job site. The student will maintain and submit a folio of experiences and write a final paper summarizing the experience and the knowledge gained from it. The student is responsible for meeting all living and travel expenses. Credit hours awarded are determined on a case-by-case basis by the Department Chair and Biology Internship Coordinator and in accord with university policy. Course grade will be determined based on the written evaluations by the field supervisor and written report rendered by the student. This course cannot be used to satisfy the biology elective requirements for the biology major or biology minor. Prerequisites: "C" or better in BIOL 299 and BIOL 303, a minimum 2.6 science GPA, and a minimum 2.75 institutional GPA. *One to three credit hours.*

BIOL 498.GENETICS SEMINAR

In this course, students examine the current research in genetics. It may include reading and analysis of research papers, research seminars presented by students or by invited guest geneticists. It cannot be used to satisfy the biology elective requirements for the biology major or biology minor. Graded pass/fail. Prerequisites: "C" or better in BIOL 312. *One credit hour.*

BIOL 499.SENIOR SEMINAR IN BIOLOGY

The third in a series of three required academic and professional development courses, this offering is designed to be taken during the student's final spring semester at Lander. It will include an oral presentation of a faculty approved literature-based research topic in biology, which should represent a culmination of biological knowledge and communication skills gained in the prerequisite courses. This course will include end-of-program assessments. Prerequisites: Instructor permission. *One credit hour.*

BIOM 111. FOUNDATIONS IN HUMAN EVOLUTION, GENETICS, AND HOMEOSTASIS

This is the first course of a two-semester introduction to medical biology for science majors. This course explores the biology of what it is to be human—the origins of human variation, inheritance in humans, the evolution of the human species, and population genetics. The course will also examine how the human body works, homeostasis, biological dysfunction, and compensation to change. Three hours lecture, three hours laboratory weekly. **Four credit hours.**

BIOM 151.MEDICAL TERMINOLOGY

This course is an introduction to the fundamentals of medical terminology including roots, prefixes, and suffixes with an emphasis on spelling, definition, and pronunciation. Cross-listed with NURS 111 and EXSC 180. **One credit hour.**

BIOM 199.FIRST-YEAR SEMINAR IN MEDICAL BIOLOGY

This is the first course in a four-course series that introduces students to careers in health care fields. The American health care system is introduced and an explanation of the requirements to work in health care are discussed. Course work includes completion of a personal statement of why students want to work in the health care field. Basic interview skills required for admission into professional school will be also be presented. Prerequisites: “C” or better in BIOL 111 or BIOM 111. **One credit hour.**

BIOM 299.SECOND-YEAR SEMINAR IN MEDICAL BIOLOGY

This is the second course in a four-course series that introduces students to careers in health care fields Building on prior coursework, additional complexities of the American health care system will be examined. Best practices for submitting applications for entry in the health care fields and interviewing skills will be practiced. Reading and interpreting clinical research and scientific primary literature will be introduced. Restricted to Medical Biology majors. Prerequisites: “C” or better in BIOM 199. **One credit hour.**

BIOM 320.BIOMEDICAL STATISTICS

This course introduces concepts for the interpretation, evaluation, and communication of biomedical research and provides the framework to rigorously analyze data. The application of statistics to biomedical sciences, including clinical trials, epidemiology, and genomics is emphasized. Topics include biomedical study design, randomization, graphical data displays, control bias, variability, interactions, and ethics of human experimentation. Prerequisite: a “C” or better in MATH 211. **Three credit hours.**

BIOM 321. FOUNDATIONS OF ENTERING POST-GRADUATE EDUCATION IN HEALTHCARE

This course reinforces the scientific reasoning and analytical skills necessary for successful admission to medical school. Students are required to take two practice MCAT exams, one near the beginning and one near the end of the course, to evaluate their understanding of the foundational concepts. Because these exams range from six to eight hours to complete, they are typically scheduled on a Saturday or Sunday. Prerequisites: “C” or better in CHEM 221 and PHYS 201 and permission of instructor. **Three credit hours.**

BIOM 371.EMERGENCY MEDICAL TECHNICIAN I

This course is a study of pharmacology, airway management, patient assessment, and trauma and shock as it relates to the provision of pre-hospital emergency medical care to critically ill and injured patients. This is the first of a two-part sequence necessary for EMT certification. The clinical lab portion will provide demonstrations and hands on experiences pertaining to lecture topics. Three hours lecture, three hours laboratory weekly. Restricted to Medical Biology majors. Prerequisites: “C” or better in BIOL 202 and BIOL 203. **Four credit hours.**

BIOM 372.EMERGENCY MEDICAL TECHNICIAN II

This course is a study of medical emergencies, operations, pediatrics, and other special populations as it relates to the provision of pre-hospital emergency medical care to critically ill and injured patients. This is the second of a two-part sequence necessary for EMT certification. The clinical lab portion will provide demonstrations and hands on experiences pertaining to lecture topics. Two hours lecture, four hours laboratory weekly. Prerequisites: “C” or better in BIOM 371. **Four credit hours.**

BIOM 399.THIRD-YEAR SEMINAR IN MEDICAL BIOLOGY

This is the third course in a four-course series introducing students to careers in health care fields. The specific requirements and skills necessary for the student’s chosen field in health care will be identified and discussed. The skills necessary for communicating with people from diverse backgrounds and with research and medical professionals will be addressed and the ethical principles of health care are introduced. Restricted to Medical Biology majors. Prerequisites: “C” or better in BIOM 299. **One credit hour.**

BIOM 499. SENIOR CAPSTONE SEMINAR IN MEDICAL BIOLOGY

This is the final course in a four course series designed to prepare students for careers in health care fields and it will be taken during a student's final semester in the program. It will include an oral and written presentation of a faculty approved literature-based research topic in health care, which will represent a culmination of biological and communication skills. Prerequisites: Graduating semester status and "C" or better in BIOM 399. ***One credit hour.***