

BIOMEDICAL SCIENCES (BMD) (BMD)

BMD 101 Orientation to BMD 1 cr

An introduction to Biomedical Sciences that will establish an early and continuing working relationship between students and faculty, increase awareness of sciences and scientists and familiarize students with functions, policies and services of the University, College and Department. Taught Fall Semester.

BMD 102 Lab Skills Bootcamp 0 cr

Lab Skills Bootcamp is an intense one-week training program to provide first-time experience and practice in basic biomedical laboratory techniques for students who have little to no research or laboratory background. Skills include basic biosafety, calculations, preparing solutions, data interpretation, micropipetting, DNA isolation, and PCR. A minimum cumulative GPA of 3.0 is required.

BMD 110 Introduction to A & P I 4 cr

An introduction to the structure and function of the human body with an emphasis on anatomy. This course surveys anatomical terminology, basic chemistry, cell structure/function, tissues, skin skeleton, joints, muscles, and central nervous system.

BMD 111 Introduction to A & P II 4 cr

Topics include, peripheral/autonomic nervous system, endocrinology, cardiovascular system, blood, respiration, digestion, metabolism/nutrition, urinary system, and reproduction.

BMD 200 Career Planning 1 cr

Clinical Observations (Medicine, Dentistry, Optometry and Veterinary Medicine). This course gives the student clinical exposure to various health-care services. It is designed to help students make informed decisions when selecting a career in the health professions. A written report on the clinical experience or scenario dealing with "medical ethics" is required. May be repeated for a maximum of six hours' credit. Permission of the Director of Health Pre-Professional Program is required.
Prerequisite: CH 131 Minimum Grade of D and BLY 121 Minimum Grade of D

BMD 201 Seminars in Biomedical Science 1 cr

This course introduces students to contemporary biomedical research and career possibilities in the biomedical sciences. Students will use the resources of the Biomedical Library to perform a literature search.

BMD 210 Microbiology in Healthcare 3 cr

This course introduces concepts of human host-infectious microbe interactions that result in disease. Microorganisms examined include viruses, parasites, fungi, mycobacteria, and bacteria. Included topics are genetics, taxonomy, microbial metabolism, virulence factors, host defense/microbe evasion mechanisms, epidemiology, antimicrobial chemotherapy/resistance, merging/reemerging infectious diseases, and diagnostic criteria. Emphasis will be placed on the microbial infections of different body systems.

Prerequisite: BLY 101 Minimum Grade of C or BLY 121 Minimum Grade of C or CH 101 Minimum Grade of C or CH 131 Minimum Grade of C

BMD 210L Microbiology in Healthcare Lab 1 cr

Laboratory experience includes introduction to fundamental microbial techniques, including differential staining, biochemical identification techniques, and antimicrobial susceptibility testing. Patient case studies will be used to supplement learning experience.

Prerequisite: (BLY 101 Minimum Grade of C or BLY 121 Minimum Grade of C or CH 101 Minimum Grade of C or CH 131 Minimum Grade of C)

BMD 212 Introduction to Food Science 3 cr

This course is an introduction to digestion, absorption, transportation, and utilization of nutrients. It will discuss the integration of basic chemical, physical, microbiological and nutritional properties and components of food and their relationship to a healthy lifestyle. Lab exercises are completed in which students prepare foods and observe the chemical and physical properties that affect the product.

Corequisite: BMD 212L

BMD 212L Intro to Food Science Lab 1 cr

Laboratory experience includes an introduction to digestion, absorption, transportation, and utilization of nutrients. Lab exercises are completed in which students prepare foods and observe the chemical and physical properties that affect the product.

Corequisite: BMD 212

BMD 251 Human Anatomy & Physiology I 4 cr

This is the first of a two-course sequence that covers basic human anatomy and physiology, including the study of the structure and function of various body systems. Included is a study of basic principles of organism homeostasis, biochemical makeup, a study of cells and tissue, cellular metabolism, joints, the integumentary, and skeletal systems, muscular and nervous systems, and the senses. Laboratory experiences are provided through demonstration and interactive (virtual) laboratories.

Prerequisite: BLY 101 Minimum Grade of C or BLY 121 Minimum Grade of C or CH 100 Minimum Grade of C or CH 131 Minimum Grade of C

Cross-Listed: BMD 114

BMD 252 Human Anatomy & Physiology II 4 cr

A continuation of BMD 251. Topics include nervous, cardiovascular, lymphatic, immune, respiratory, digestive, and urinary systems. Additional topics may include blood, metabolism, immunology and reproduction. Laboratory experience is provided through demonstration and interactive (virtual) laboratories.

Prerequisite: BMD 251 Minimum Grade of C

Cross-Listed: BMD 115

BMD 290 Sp Top - H - 1-3 cr

Topics of current health interest.

BMD 311 Human Anatomy 3 cr

A course in human gross and microscopic anatomy in a systematic approach, with an emphasis on structure-function relationships at the cell, tissue and organ level. The topics include anatomy of integumentary, musculoskeletal, nervous, cardio-vascular, lymphatic, respiratory, digestive, urinary and reproductive systems. This course is lecture-based with no lab component.

Prerequisite: BLY 121 Minimum Grade of D

BMD 321 Biochemistry I-Molecular Biol 3 cr

The course covers different aspects of molecular biology including protein structure and function, carbohydrate, lipids, DNA replication, transcription and translation and applications to medical problems (i.e., forensic medicine, diagnosis of genetic diseases, etc).

Prerequisite: CH 201 Minimum Grade of D

BMD 322 Biochemistry II-Metabolism 3 cr

The course discusses the chemical basis of metabolism including the conversion of nutrients from digestion to either molecules of biological relevance or to energy. Genetic diseases affecting these pathways are described and discussed.

Prerequisite: (BMD 321 Minimum Grade of C or BLY 440 Minimum Grade of C or CH 440 Minimum Grade of C) and CH 201 Minimum Grade of D

BMD 323 Biochemistry Laboratory 2 cr

This laboratory is designed to provide hands-on experience on several biochemical techniques including cell fractionation, chromatography, DNA isolation, electrophoresis, determination of enzyme activity, etc.

Prerequisite: BMD 321 Minimum Grade of C

BMD 331 Biotechnology Skills I 4 cr

This course is designed to train students in fundamental biotechnology laboratory skills and applying the scientific method to create, test, and interpret new hypotheses. Students will collaborate with peers and faculty to generate publishable data, and present their findings in both written and oral form.

Prerequisite: (BMD 323 Minimum Grade of C and BMD 350 Minimum Grade of C)

BMD 334 Human Physiology I 3 cr

The objectives of this course are to study human physiology with emphasis on cellular physiology (cell structure, metabolism, and transport) and the endocrine and nervous systems and skeletal muscle. This course is the first of a 2 course sequence.

Prerequisite: BLY 121 Minimum Grade of C and CH 131 Minimum Grade of C and CH 132 Minimum Grade of C

BMD 335 Human Physiology II 3 cr

Study of human physiology with emphasis on the basic principles of organ system physiology. The course emphasizes muscle, cardiovascular, renal, respiratory, digestive, and reproductive physiology and an introduction to immunology. This is the second course in a 2 course sequence.

Prerequisite: BMD 334 Minimum Grade of C

BMD 336 Physiology Lab - W 2 cr

This laboratory is designed to provide students with hands-on laboratory experience in physiology, with emphasis on the musculoskeletal, cardiovascular, respiratory and nervous systems. Limited to BMD majors unless by special permission. Special fee.

Prerequisite: (BMD 334 Minimum Grade of C and (EH 102 Minimum Grade of C or EH 105 Minimum Grade of C))

Corequisite: BMD 335

BMD 350 Human Genetics and Genomics 3 cr

This course presents the principles and current information about classical, molecular, and population genetics. It gives an understanding of DNA, gene, gene function and regulation, genome, and the mechanisms of Mendelian and non-Mendelian inheritance. The focus is on human genetics by understanding the clinical applications of genetics and genomics in human health and disease, with special emphasis on chromosomal abnormalities, gene mutations, cancer genetics, and gene therapy.

Prerequisite: BMD 321 Minimum Grade of C or BLY 301 Minimum Grade of C or BLY 440 Minimum Grade of C

BMD 351 Global Health-W 3 cr

This course introduces students to the basic principles of global public health that are used to improve population health at all levels. Students will get an overview of the determinants of health and how health status is measured. Students will also review the burden of disease, who is most affected by different disease burdens, risk factors, and key measures to address the burden of disease in cost-effective, doable, sustainable, and fair ways. Special attention will be paid throughout the course to health systems issues. The course will cover key concepts and frameworks but be practical in orientation. The course will be global in coverage but with a focus on low- and middle-income countries, the health of the poor and health disparities. Particular attention will be paid throughout the course to the linkages between health and development.

BMD 390 Sp Top - 1-6 cr

Topics of current health interest.

BMD 401 Immunology 3 cr

This course presents the basic concepts of immunochemistry, immunobiology and host immune responses to disease. Antigens, antibodies, cells and structures of the immune system will be discussed as well as their roles in the processes of immunity, allergies, transplantation, and diseases.

Prerequisite: BMD 321 Minimum Grade of C

BMD 402 Medical Microbiology 4 cr

This course presents the concepts of pathogenicity and virulence as they relate to disease causing bacteria, mycobacteria, fungi, protozoans, and viruses. Mechanisms of pathogenicity, host interactions, epidemiology and diagnosis will be emphasized. General concepts of microbial physiology, taxonomy, genetics, host immune response, and antimicrobial therapy are also presented. The laboratory portion of the course will provide hands-on experience in the handling and identification of each microbe class. Special fee.

Prerequisite: (BMD 321 (may be taken concurrently) Minimum Grade of C or BLY 440 Minimum Grade of C or CH 440 Minimum Grade of C)

BMD 403 Molecular Basis of Cancer 3 cr

This course will focus on the biological and molecular features of oncogenesis and clinical cancer, with specific attention given to the molecular events underlying carcinogenesis, metastasis, and angiogenesis. Recent therapeutic advances and their implications for the field will be explored through reading of current scientific literature. Case study learning is integrated into the course to help students understand the societal implications of cancer. Credit cannot be received for BMD 403 and BMD 503.

Prerequisite: BMD 321 Minimum Grade of C or BLY 301 Minimum Grade of C or BLY 302 Minimum Grade of C

Cross-Listed: BMD 503

BMD 410 Pathophysiology 3 cr

A systematic study of disease processes involving relationships between pathophysiological changes and clinical manifestations.

Prerequisite: BMD 321 Minimum Grade of C

BMD 415 Microscopic Anatomy 4 cr

A course in (human) microscopic anatomy with laboratory emphasizing recognition and utilizing traditional histologic techniques to process tissue for microscopic examination. Taught Fall Semester.

Prerequisite: BMD 311 Minimum Grade of D

BMD 420 Pharmacology 3 cr

An introduction to pharmacological concepts and effects and uses of major drug classes. Drug design, pharmacodynamics (receptors, mechanisms, dose-response) and pharmacokinetics (time action) are discussed in general (principles), and in particular, for selected classes of drugs. Credit cannot be received for BMD 420 and BMD 520.

Prerequisite: (BMD 321 Minimum Grade of C or BLY 440 Minimum Grade of C or CH 440 Minimum Grade of C)

Cross-Listed: BMD 520

BMD 430 Neurosciences 4 cr

A study of neuroscience which integrates neurochemistry, neuroanatomy, and neurophysiology, emphasizing cellular neurobiology, neural systems, and the neurobiology of behavior. Course includes laboratory experience. Credit cannot be received for BMD 430 and BMD 530.

Prerequisite: BMD 311 Minimum Grade of C and BMD 334 Minimum Grade of C

Cross-Listed: BMD 530

BMD 434 Human Physiology 6 cr

A study of human physiology from cells to systems. A strong foundation in biology and general chemistry is required. Special permission from instructor required. Prerequisites: BLY 121 and 122, CH 131 and 132.

Prerequisite: (BLY 121 Minimum Grade of D or BLY 141 Minimum Grade of D) and (BLY 122 Minimum Grade of D or BLY 142 Minimum Grade of D) and (CH 115 Minimum Grade of D or CH 131 Minimum Grade of D) and (CH 116 Minimum Grade of D or CH 132 Minimum Grade of D)

Cross-Listed: BMD 534

BMD 441 Epidemiology 3 cr

This course will cover a wide variety of topics along with providing students in-field examples of the use of epidemiology and statistics for public and global health. The goal is to become familiar with basic statistical concepts, epidemiologic terminology, outcome measures, and study designs; to appreciate application of epidemiology to subfields (e.g., infectious diseases, reproductive health, genetics); and to apply epidemiologic methods to current public health issues.

Prerequisite: (ST 210 Minimum Grade of D or ST 305 Minimum Grade of D)

BMD 450 Introduction to Research 2 cr

The purpose of this course is to relay the relevance of biomedical research to all medical practices. First, students will learn how to systematically read, analyze, and present primary biomedical science literature. Second, students will learn how to design a new research project. Written abstracts and oral classroom presentations are required.

Prerequisite: BMD 321 Minimum Grade of C

BMD 451 Biotechnology Skills II 4 cr

Students will learn the biological principles of genome editing and its applications in biotechnology. Emphasis will be on CRISPR/Cas technology in prokaryotic and eukaryotic biological systems. Students will perform CRISPR/Cas9 gene editing and collaborate with peers and faculty to generate a knock-out cell line.

Prerequisite: (BMD 331 Minimum Grade of C)

BMD 490 Special Topics 1-6 cr

Topics of current health interest.

BMD 493 Ethical Issues in Health - W 3 cr

This course will provide an open forum for discussion of current controversial issues in biomedical sciences. The topics will include research integrity, discussions on the impact of medical advances in society as well as issues of historical relevance.

Prerequisite: (BLY 121 Minimum Grade of C) and (EH 102 Minimum Grade of C or EH 105 Minimum Grade of C)

BMD 494 Directed Research Studies 1-3 cr

The student will perform a biomedical research project under the direction of a faculty mentor. This will include literature searches and presenting the project in a written format. Instructor Permission Required. Credit cannot be received for BMD 494 and BMD 594.

Prerequisite: BMD 321 Minimum Grade of C

Cross-Listed: BMD 594

BMD 499 Honors Research Thesis - W - H 1-6 cr

Literature survey and laboratory research experience under the direction of the faculty. Instructor permission required.

Prerequisite: BMD 311 Minimum Grade of C and BMD 322 Minimum Grade of C and BMD 323 Minimum Grade of C and BMD 335 Minimum Grade of C and BMD 336 Minimum Grade of C

BMD 500 Graduate Seminar 2 cr

Professional growth through in-depth experiences in the presentation of problems and formal papers, with emphasis on guided discussions and research criticism. A different topic of current health interest will be selected every semester for in-depth coverage and discussion. Various aspects of the selected topic will be presented by both faculty and students. Each presentation will focus on a single paper from the current biomedical literature.

BMD 501 Immunology 3 cr

This course presents the basic concepts of immunochemistry, immunobiology, and host immune responses to disease, antigens, antibodies, cells and structures of the immune system will be discussed as well as their roles in the process of immunity, allergies, transplantation and diseases. A term paper is required.

BMD 502 Medical Microbiology 4 cr

This course presents the concepts of pathogenicity and virulence as they relate to disease causing bacteria, mycobacteria, fungi, protozoans, and viruses. Mechanisms of pathogenicity, host interactions, epidemiology and diagnosis will be emphasized. General concepts of microbial physiology, taxonomy, genetics, host immune response, and antimicrobial therapy are also presented. The laboratory portion of the course will provide hands-on experience in the handling and identification of each microbe class. A term paper is required. Credit cannot be received for both BMD402 and BMD502

Cross-Listed: BMD 402

BMD 503 Molecular Basis of Cancer 3 cr

This course will be a discussion of the biological and molecular features of oncogenesis and clinical cancer focusing on the specific molecular events underlying carcinogenesis, metastasis, and angiogenesis. Case study learning will be integrated into the course to engage students in understanding the societal implications of cancer. A term paper is required. Credit cannot be received for both BMD 403 and BMD 503.

Cross-Listed: BMD 403

BMD 507 Advanced Physiology 4 cr

The foundation of the biomedical sciences in physiology - the study of the function of the human body. This course will cover advanced concepts in body function from the molecular, cellular, and organ levels. In addition, there will be a weekly focus on current literature reports that coordinate with recent lecture topics.

BMD 508 Human Gross Anatomy 4 cr

This is a course in gross anatomy of human body systems utilizing human cadavers and prosected specimens. Emphasis is placed on the relationships between structure and function. The lecture component of the course will be presented through live in person lectures and recorded video lectures on selected topics. The laboratory component will consist of dissection of human cadaver. Prosected material, skeleton models and diagnostic imaging will be introduced for each area of dissection.

BMD 520 Pharmacology 3 cr

This course will help students master the practical competencies of basic pharmacology. It will focus on the pharmacology of drugs including their classification and origin, pharmacokinetics, mechanism of action, indications, contraindications, adverse and side effects, drug interactions, and use in special patient populations. You will learn how drugs affect different biological systems, how the body responds to those drugs, and why one drug does not fit all. It is the responsibility of the student to go over the biochemistry and physiology concepts learned in previous courses to better understand this course.

Cross-Listed: BMD 420

BMD 530 Neurosciences 4 cr

A study of neuroscience which integrates neurochemistry, neuroanatomy, and neurophysiology, emphasizing cellular neurobiology, neural systems, and the neurobiology of behavior. Course includes laboratory experience. A term paper is required. Credit cannot be received for BMD 430 and BMD 530.

Cross-Listed: BMD 430

BMD 534 Human Physiology 6 cr

A study of human physiology from cells to systems. A strong foundation in cell biology and general chemistry is required. This course is restricted to pharmacy students or special permission from the instructor.

Prerequisites: BLY 121, BLY 122, CH 131, CH 132.

Prerequisite: (BLY 121 Minimum Grade of D or BLY 141 Minimum Grade of D) and (BLY 122 Minimum Grade of D or BLY 142 Minimum Grade of D) and (CH 115 Minimum Grade of D or CH 131 Minimum Grade of D) and (CH 116 Minimum Grade of D or CH 132 Minimum Grade of D)

Corequisite: BMD 536

BMD 536 Physiology Lab 1 cr

This laboratory is designed to provide hands-on laboratory experiments to accompany the lecture material in BMD 534. This course is restricted to pharmacy students or special permission from the instructor.

Corequisite: BMD 534.

Corequisite: BMD 534

BMD 594 Directed Studies 1-3 cr

With the guidance of a faculty mentor, students will complete an independent research project (quantitative or qualitative) that will include a complete literature search, hypothesis development and testing through either laboratory experiments or meta-analysis, and final written report and analysis. Approval by the mentor and/or Graduate Director is required.

Cross-Listed: BMD 494