BIOLOGY (BIO)

BIO 100 Intro to Anatomy/Physiology 3 sem. hrs.

The Introduction to Anatomy and Physiology course will study the shape, structure, and function of the human body and its parts. Content includes: basic anatomy and directional terminology, structure and function of body systems, fundamental concepts and principles of body organization. A grade of C- or better is required to enroll in BIO 209. The credits from this course do not count toward the requirements for science or pre-nursing/nursing majors. 3 one-hour lecturesper week. Offered every fall.

BIO 101 FD: T1:Principles of Biology I 3 sem. hrs.

This course introduces the concept of scientific inquiry, the nature, history and place of science in human endeavor. It probes the makeup of living systems the lifecycles and interdependence of organisms and natural and unnatural hazards to life and development. Focuses are on cell biology, cellular structure and function, energy metabolism, photo synthesis, membrane structure and function, DNA and RNA, and proteins. Mitosis, meiosis, classical genetics and modern DNA technology, genetics and modern DNA technology are covered. Offered every fall.

BIO 101L Principles of Biology I: Lab 1 sem. hr.

Students will perform investigative experiments using the scientific method to explore the concepts of cells, enzymes, water relations, respiration, and photosynthesis. They will explore the concepts of meiosis, mitosis, genetics, microevolution, and macroevolution using simulations and computer models. Offered every fall.

BIO 102 Principles of Biology II 3 sem. hrs.

This course presents the history of the earth, structure and function of living things while looking at the regulation and behavior of living things and investigating scientific questions and concepts. An understanding of the unifying themes in the biological sciences and an overview of the variety of life on earth are presented. Topics include: cell biology, mechanisms of speciation and evolution, the evidence for evolution, taxonomy, viruses, prokaryotes, fungi, algae and protozoans. Offered every spring.

BIO 102L Principles of Biology II: Lab 1 sem. hr.

Students learn the principles of classification and identification of organisms. They will explore the diversity of prokaryotes and eukaryotes through the study of preserved and living specimens. They will explore ecological and evolutionary concepts using simulations and computer models. Offered every spring.

BIO 103 Intro Research Immersion 1 sem. hr.

The purpose of this course is to introduce students to the field of research and prepare them in the skills, techniques, and knowledge necessary to undertake research. Students will be exposed to multiple research projects and have a chance to identify research interests of their own. Offered every spring.

BIO 120 Intro to Bioinformatics 3 sem. hrs.

Bioinformatics is the application of computer power to problems in Biology and medicine. This course provides an introduction to the problems addressed by the cross-disciplinary field of bioinformatics, and to some of the tools made available by this technology. Students will use bioinformatics to investigate genome organization, gene structure, and the four levels of protein structure. Students are introduced to molecular visualization tools, sequence analysis software, and on-line sequence comparison tools. A short paper is required, investigating a particular gene, its product, the structure of the product, and its function in the cell. Cross-listed as CS 120. Offered every fall.

BIO 125 Clinical Correlation I 0.5 sem. hrs.

A one semester learning experience involving a once weekly meeting to explore health-related careers including hands-on experiences and guest speakers. This course is also designed to help students make connections between their course work and their future careers.

BIO 200 Medical Terminology 1,2 sem. hrs.

This course introduces students to an extensive list of commonly used terms in medicine. Emphasis is placed on learning the Latin and/or Greek language-based terms and their use in a wide array of technical language in medicine and science. Offered every fall and spring semester.

BIO 206 Microbiology 3 sem. hrs.

This course introduces the student to microorganisms including bacteria, fungi, protozoa, helminthes and viruses. Emphasis is placed on the structure and life processes of these microorganisms along with their role in causing human diseases and the host response to infectious diseases. Offered every fall and spring semester and usually in summer. Prerequisites: Students must have earned a C- or higher grade in either BIO 101-102 or BIO 209-210 and CHEM 101-102 or CHEM 120 prior to taking this course.

BIO 206L Microbiology: Lab 1 sem. hr.

Students examine the microscopic and macroscopic structure of microorganisms.Students learn basic laboratory techniques including gram staining, plate streaking, methods for quantifying microorganisms, and biochemical/immunological tests needed to identify microorganisms. The laboratory meets for two hours per week. Offered every fall and spring and usually in summer.

Prerequisites: Students must have earned a C- or higher grade in either BIO 101-102 or BIO 209-210 and CHEM 101-102 or CHEM 120 prior to taking this course.

BIO 209 Anatomy/Physiology I 3 sem. hrs.

This course is the first course of a two-semester sequence in which the structure and function of the human body are studied using a systemic approach. Three hr/week lecture sessions address primarily, though not exclusively, body function (physiology) while laboratory sessions address structure (anatomy). Topics include the basic anatomical and directional terminology; fundamental principles of cell biology; histology; the integumentary, skeletal, nervous (including special senses) and endocrine systems. Unifying themes, such as homeostasis are emphasizedthroughout both semesters. Offered every fall, spring and summer.

Prerequisite: High school biology and chemistry.

BIO 209L Anatomy/Physiology I: Lab 1 sem. hr.

This course is the laboratory component of the anatomy and physiology course and is recommended to be taken concurrently with the BIO 209 lecture course. Laboratory sessions address primarily, though not exclusively, structure (anatomy), while lecture sessions address body function (physiology). It provides hands-on exploration of human anatomy and covers tissues, skeletal system, nervous system and special senses. The laboratory meets two hours per week. Offered every fall, spring, and summer.

BIO 210 Anatomy/Physiology II 3 sem. hrs.

This course is the second course of a two-semester sequence in which the structure and function of the human body are studied using a systemic approach. Three hr/week lecture sessions address primarily, though not exclusively, body function (physiology) while laboratory sessions address structure (anatomy). Topics include the muscular, lymphatic, cardiovascular, respiratory, digestive, urinary and reproductive systems; metabolism; fluid/electrolyte /acid/base balance; development and inheritance. Unifying themes, such as homeostasis is emphasized throughout both semesters. Offered every fall, spring, and summer sessions.

Prerequisite: Successful completion of BIO 209 or by permission.

BIO 210L Anatomy/Physiology II: Lab 1 sem. hr.

This course is the laboratory component of the anatomy and physiology course and is recommended to be taken concurrently with the BIO 210 lecture course. Laboratory sessions address primarily structure (anatomy), while lecture sessions address body function (physiology). It provides hands-on exploration of human anatomy through animal dissection with human cadavers as prosections. Topics include the muscular, lymphatic, cardiovascular, respiratory, digestive, urinary andreproductive systems. Offered every fall, spring, and summer. Prerequisite: Successful completion of BIO 209L or by permission.

BIO 225 Clinical Correlation II 0.5 sem. hrs.

A one semester learning experience involving a once weekly meeting to explore health-related careers including hands-on experiences and guest speakers. This course is also designed to help students make connections between their course work and their future careers.

BIO 280 Bioinformatics Seminar 1 sem. hr.

A one-credit course in which on-line genome databases will be explored. The course culminates with a project inquiring into some aspect of cell biology, drawing on bioinformatics tools made available by various databases, such as the human genome browsers at NCBI, EMBL, and UCSD, the OMIM and OMIA databases, and gene expression data from EST and microarray databases. Cross-listed as CS 280. Offered every spring.

Prerequisites: BI0101-102.

BIO 301 Anat/Evol of Vertebrates 4 sem. hrs.

(Formerly Comparative Anatomy) Combined lecture and laboratory experience investigating the anatomy and phylogeny of vertebrates. The course is designed on a systems basis, including skeletal, respiratory, reproductive, etc. It also explores the development of different vertebrates and the connections between evolution and development. Regular lab exercises as part of lecture time. Offered as needed. Prerequisite: BIO 102; BIO 209-210.

BIO 302 Parasitology 3 sem. hrs.

This course offers a taxonomic-based introduction to the morphology, life-histories, and pathogenicity of common animal parasites with special emphasis on those affecting humans. The host immune response to parasitic infections and chemotherapies available to treat parasitic infections are discussed. Current journal articles are discussed. Recommended: BIO 206. Offered fall on every even-numbered year. Prerequisite: BIO 101-102.

BIO 302L Parasitology: Lab 1 sem. hr.

The laboratory compliments the lecture. Students study the life cycles of parasites and learn to recognize the intermediary and adult forms of parasites causing human disease. The vectors which spread the parasites are studied as well. It is suggested that the student take the laboratory portion simultaneously with the lecture portion of the course. Recommended: BIO 206. Offered fall on every even-numbered year. Prerequisite: BIO 101-102.

BIO 303 Pathogenic Bacteriology 3 sem. hrs.

Course emphasizes major human bacterial pathogens and details the molecular mechanisms by which virulence factors contribute to disease. The host defense mechanisms against bacterial infections are examined. The prevention and treatment of bacterial infections are examined. Current journal articles are discussed. Offered spring on odd-numbered years.

Prerequisite: BIO 206, BIO206L.

BIO 303L Pathogenic Bacteriology: Lab 1 sem. hr.

The laboratory compliments the lecture and examines case studies of bacterial infections and is offered simultaneously with BIO 304L. Techniques for handling and growing bacteria and for identifying pathogenic bacteria with emphasis on immunoassays are introduced in the lab. It is suggested that the student take the laboratory portion simultaneously with the lecture portion of the course. Prerequisite: BIO 206 and BIO 206L

BIO 304 Immunology 3 sem. hrs.

Introductory course describing the components and mechanisms involved in immune response. Diagnostic immunology and importance of clinical immunology in medicine are included. Offered every spring. Prerequisites: BIO 209, BIO 210, CHEM201/CHEM 208, CHEM 202/ CHEM 209 and CHEM 210.

BIO 304L Immunology Lab 1 sem. hr.

The laboratory focuses on the immunoassays used in the clinical laboratory to identify pathogens and is offered simultaneously with BIO 303L. Students will learn techniques for handling and growing bacteria and for identifying pathogenic bacteria with emphasis on immunoassays in the lab. The laboratory meets for two hours per week. It is suggested that the student take the laboratory portion simultaneously with the lecture portion of the course.

Prerequisite: BIO 209, BIO 210, CHEM 208, CHEM 209, CHEM 210.

BIO 305 Botany 3 sem. hrs.

This course builds on the botanical foundation from BIO 102 Principles of Biology II course and is split into 3 themes. We will begin with an evolutionary study of anatomy and morphology of plants. Next, we will do an overview of the entire plant kingdom with emphasis on the diversity and classification of the angiosperms. Finally, we will study plant physiology including photosynthesis, transpiration, and plant hormones. Students are expected to participate in field trips outside of the scheduled class time. Offered every fall.

Prerequisites: BIO 101, 102 or permission from instructor.

BIO 306 Cell Biology 3 sem. hrs.

This course emphasizes the cell as the basic unit of life in both prokaryotic and eukaryotic organisms. The course looks at the chemical nature of the macromolecules found in cells, the makeup and function of cellular organelles and the flow of energy in the cell. Life processes including transport across membranes, cellular movement, cell cycling, expression and regulation of cell genomes are examined. Offered every fall.

Prerequisites: BIO 101, BIO 102, CHEM 208, CHEM 209, and CHEM 210.

BIO 306L Cell Biology: Lab 1 sem. hr.

This laboratory experience is meant to compliment the lecture. The focus of the laboratory is to analyze the macromolecules in cells by chemical and immunological assays. The laboratory meets for three hours per week. It is suggested that the student take the laboratory portion simultaneously with the lecture portion of the course. Prerequisites: BIO 101, BIO 102, CHEM 208, CHEM 209, and CHEM 210.

BIO 307 Essential Biochemistry 3 sem. hrs.

(See Chemistry 307). Offered every spring semester.

BIO 307L Essential Biochemistry:Lab 1 sem. hr.

BIO 309 Human Physiology 4 sem. hrs.

An upper-level course emphasizing the interactions between the complex components of physiological systems. Course reinforces foundations in physiology that are important for students in the medically related sciences. Students will develop active learning skills through problem solving and experimentation. Offered every fall. Prerequisites: BIO 209, 210 or permission of instructor.

BIO 314 TH2:General Ecology 3 sem. hrs.

Course provides an understanding of interrelationships of plants and animals to each other and to their physical environment, including how soil, temperature, light, water, and other environmental factors affect geographical distribution of plants and animals. Students are expected to participate in several field trips. Offered every spring. Prerequisite: one biology or natural science course.

BIO 315 TH2:SL:Field Botany 4 sem. hrs.

Students become familiar with a diversity of plants in the field and with scientific methods of collecting, identifying, and cataloging plants. Also included are discussions of ecological and morphological adaptations of plants to their environment and geographic distribution of plants as it relates to geology and climatology. Course is largely field work and may include overnight stays. Offered in the summer. Prerequisite: BIO 101, 102.

BIO 320 Biochemistry I 3 sem. hrs.

This course explores the chemistry of biological compounds that include amino acids, proteins, carbohydrates, lipids, vitamins, and nucleic acids with an emphasis on their structure-function relationships. Protein structure and biosynthesis, enzymes kinetics and mechanisms, and biological membranes are covered in detail. This course is required for Biochemistry majors and most pre-pharmacy students. All preprofessional students, biology majors and chemistry majors are welcome to enroll. Cross-listed as CHEM 320. Offered every fall on odd-numbered years.

Prerequisites: CHEM 201, 202 with labs.

BIO 320L Biochemistry I:Lab 1 sem. hr.

This laboratory course is designed to introduce the students to modern biochemical experimental methods for studying the chemical and physical properties of biological molecules. Experiments will include the use of buffers, spectroscopy, enzyme assays, chromatography, electrophoresis, and immunoassays in the analysis of biological macromolecules. Isolation and purification techniques will be emphasized along with quantitative procedures. Students will be expected to keep a professional quality research notebook, read biochemical research articles and complete experimental work weekly. Cross-listed as CHEM 320L. It is highly recommended that students enroll in BIO 320/CHEM 320 simultaneously. Offered every fall on odd-numbered years.

Prerequisites: CHEM 201, 202 with labs.

BIO 321 Biochemistry II 3 sem. hrs.

This course is a continuation of CHEM 320 course with an emphasis on the metabolism of carbohydrates, lipids, and proteins in physiological systems. The metabolic pathways are examined from an integrated thermodynamic and kinetic regulatory perspective. Cellular signaling, metabolic disorders, and the role of ATP, and its production are fully considered. Applications of biochemistry in medicine and pharmaceuticals are also emphasized. Special discussion is placed on important biochemistry research topics during the latter part of the semester forwhich much material is drawn from the current biochemical literature. This course provides the linkage between the inanimate world of molecular biochemistry majors and most pre-pharmacy students. All pre-professional students, biology majors and chemistry majors are welcome to enroll. Cross-listed as CHEM 321. Offered every spring on even numbered years.

Prerequisites: CHEM 320.

BIO 321L Biochemistry II:Lab 1 sem. hr.

An extension of BIO 320/CHEM 320 lab, this laboratory course is designed to continue introducing the students to modern biochemical experimental methods for studying the chemical and physical properties of biological molecules. Experiments will include the use of buffers, spectroscopy, enzyme assays, chromatography, electrophoresis, and immunoassays in the analysis of biological macromolecules. Isolation and purification techniques will be emphasized along with quantitativeprocedures. Students will be expected to keep a professional quality research notebook, read biochemical research articles and complete experimental work weekly. Cross-listed as CHEM 321L. It is highly recommended that students enroll in BIO 321/CHEM 321 simultaneously. Offered every spring on even-numbered years. Prerequisites: BIO 320/CHEM 320 with lab.

BIO 325 Clinical Correlations III 0.5 sem. hrs.

A one semester learning experience involving a once weekly meeting to explore health-related careers including hands-on experiences and guest speakers. This course is also designed to help students make connections between their course work and their future careers.

BIO 330 CIT: TH2: Conservation Biology 3 sem. hrs.

Examines the protection and management of the Earth's diverse species, habitats, and ecosystems. Offered spring on odd-numbered years.

Prerequisite: One biology or natural science course.

BIO 390 Biology Internship 1-3 sem. hrs.

The Biology internship offers course credit for practical learning experiences in the fields of biology, biochemistry, environmental science, pre-professional school areas, bio-informatics, clinical laboratory sciences and comprehensive science. The internship can be set up with a company, organization or group so that students gain valuable applied experience in biology-related studies. Internships must provide supervised experiences in biology-related fields resulting in a written report by the student, a supervisor evaluation and a faculty assessment of learning that transpired. Internship readiness is determined by student advisor in biology-related fields. Offered every fall and spring.

BIO 402 CH: Genetics 3 sem. hrs.

The course examines the role of DNA as the basic molecule of heredity in viruses, prokaryotes and eukaryotes and its transmission to offspring. Topics discussed include Mendelian laws of heredity, polygenic traits, probabilities of inheritance, meiosis/mitosis, linked traits, chromosome mapping, crossing-over and population genetics involving the Hardy-Weinberg law. The structure of the gene is studied andthe regulation of its expression in prokaryotes and eukaryotes is examined. The relationship between genes and disease including cancer is discussed. Recommended: BIO 306. Offered every spring. Prerequisite: BIO 101, 102 or BIO 209, 210.

BIO 402L Genetics: Lab 1 sem. hr.

This laboratory experience is meant to compliment the lecture. The laboratory exercises examine the transmission of genetic traits in fruit flies, fungi, bacteria and humans. DNA is extracted and analyzed by electrophoresis and tools of bioinformatics. Recommended: BIO 306. It is suggested that the student take the laboratory portion simultaneously with the lecture portion of the course. Offered every spring. Prerequisite: BIO 101, 102 or BIO 209, 210.

BIO 403 Clinical Biochemistry 3 sem. hrs.

Clinical Biochemistry is concerned with the detection and measurement of biochemical changes in disease. This course focuses on the areas of body function required for the maintenance of health including: carbohydrates metabolism, transport and storage of lipids and lipoproteins, acid-base balance and blood gases as well as control of water and electrolytes and kidney function. Genetic control is covered with an emphasis on endocrinology including thyroid hormones. Thecourse also includes a discussion of digestion, nutrition, and drugs, in addition to, liver function, relevant enzymology and the immune system. This course is suitable for students interested in careers in biochemistry, chemistry, biology, medicine, dentistry, pharmacy, and veterinary. Crosslisted as CHEM 403. Offered fall on even-numbered years. Prerequisites: BIO 320/CHEM 320, BIO 321/CHEM 321 or BIO 307/ CHEM 307.

BIO 404 Physical Biochemistry 3 sem. hrs.

Physical Biochemistry aims at understanding biological systems and processes in terms of the underlying physical and chemical laws. The course quantitatively investigates the interactions, dynamics, and structure of biological molecules at the molecular level in terms of kinetics, thermodynamics, spatio-temporal organization. Cross-listed as CHEM 404. Three one-hour lectures per week. Offered spring on oddnumbered years.

Prerequisite: MATH 210A.

Corequisite: MATH 210A.

BIO 405 Microanatomy 3 sem. hrs.

This course examines the structure of tissue at the light and electron microscopic level and has been updated to include recent findings in cellular, genetics and developmental biology pertaining to microanatomy. The course begins with an introduction to the structure of the cell and the organelles found within the cell as well as the extracellular matrix found around the cells. The course focuses upon the organization of cells and their extracellular matrix into tissues. Differentiationof tissues and pathology of tissue in several human diseases is examined. Offered fall on odd-numbered years.

Prerequisite: BIO 209, 210.

BIO 405L Microanatomy: Lab 1 sem. hr.

The student will study the microscopic appearance of cells and the organization of the cells with the extracellular matrix into tissue. It is suggested that the student take the laboratory portion simultaneously with the lecture portion of the course. Offered fall on odd-numbered years.

Prerequisites: BIO 209, 210.

BIO 407 Molecular Pharmacology 3 sem. hrs.

This course deals with the biochemistry and physiology of drugs and their effects on living systems. As is the case with the science of pharmacology, the interactions of drugs with cellular targets are used as a means to understand normal cellular functions. We will deal with common over-the counter medications, prescription medications, antibiotics, drugs acting on the central nervous system, drugs of abuse, and new approaches to drug therapy.

Prerequisites: BIO 209, BIO 210, CHEM 208, CHEM 209, and CHEM 210.

BIO 408 Virology 3 sem. hrs.

Introductory course which emphasizes the morphology, replication, and pathogenicity of viruses which infect animals, plants and bacteria, with special emphasis on those infecting man. Recommended: BIO 306. Offered spring on even-numbered years. Prerequisites: BIO 206.

BIO 408L Virology:Lab 1 sem. hr.

This laboratory experience is meant to compliment the lecture. Students will work with bacteriophage and animal viruses and perform growth curve experiments and titrations of virus stocks. SDS-PAGE and immunoassays will be used to monitor the expression of viral proteins. It is suggested that the student take the laboratory portion simultaneously with the lecture portion of the course. Offered spring on even-numbered years.

Prerequisites: BIO 206.

BIO 410 Topics in Biology 1 sem. hr.

These advanced biology courses are offered periodically and strategically as needed. Topics can vary across the entire spectrum of biological studies and these courses provide students diverse choices in specialized areas of advanced biology. Check with course instructors for enrollment prerequisites as courses are posted.

BIO 410L Topics in Biology: Lab 1 sem. hr.

BIO 411 Independent Research 1,2 sem. hrs.

Intended for advanced students, course includes methods for searching the biological literature and using the library. Research projects typically involve advanced experimental work and submission of a paper. Projects are assigned with intent to produce publishable data and results. Permission of Instructor. A Maximum of 2 credits can be applied to upperdivision biology requirements for the major or the minor. Offered every fall.

BIO 412 Independent Research 1,2 sem. hrs.

Intended for advanced students, course includes methods for searching the biological literature and using the library. Research projects typically involve advanced experimental work and submission of a paper. Projects are assigned with intent to produce publishable data and results. Permission of Instructor. A Maximum of 2 credits can be applied to upperdivision biology requirements for the major or the minor. Offered every spring.

BIO 414 Cellular Molecular Tech 3 sem. hrs.

An upper-level techniques-based course designed to prepare students for graduate level research. In this course students will not only master and make use of various techniques commonly encountered in a Cell or Molecular biology lab, such as: Preparation of buffers/solutions, DNA, RNA and Protein extraction, agarose gel electrophoresis, use of restriction endonucleases, PCR, RT PCR and Real-TimePCR, DNA sequencing, SDS PAGE, Western Blotting, Immunocytochemistry,Tissue Culture, Ion Exchange, Immunoaffinity, Size Exclusion and DNA affinity Chromatography; they will also be reintroduced to the scientific method and use of research tools to search the primary literature. Writing and data analysis and presentation in the sciences is also emphasized as each student will write agrant-like proposal, abstract and generate a poster that will be presented on campus to the science faculty. Offered every fall.

Prerequisite: BIO 101 and BIO 102 or BIO 209 and BIO 210, BIO 206, CHEM 208, CHEM 209, and CHEM 210.

BIO 415 Evolution 3 sem. hrs.

This course is the study of the causes, processes and consequences of evolution. Topics will include an examination of macroevolutionary patterns and microevolutionary processes along with an overview of the major evolutionary trends in biotic diversity. Offered as needed. Prerequisite: BIO 101, 102 and junior or senior standing.

BIO 420 Bioinformatics Applications 3 sem. hrs.

In this course we will learn to use many of the tools of bioinformatics, including genome database, BLAST searcher, DNA analysis software, and protein structure modeling. Biology majors will complete a project which relates to one of their upper-level biology classes. CS students will complete a project involving programming or another CS activity. Cross-listed as CS 420. Offered every fall.

Prerequisites: for biology majors, BIO 101-102 along with one of BIO 306, BIO 403, or BIO 307/CHEM 307; for CS majors, junior or senior students who have completed at least 2 programming courses.

BIO 425 Clinical Correlations IV 0.5 sem. hrs.

A one semester learning experience involving a once weekly meeting to explore health-related careers including hands-on experiences and guest speakers. This course is also designed to help students make connections between their course work and their future careers.

BIO 435 Limnology (Aquatic Ecology) 3 sem. hrs.

The interdisciplinary study of inland waters including lakes, wetlands, ground water, and streams. Offered fall on even-numbered years. Prerequisite: BIO 101, 102; CHEM 101, 102.

BIO 436 Senior Capstone Experience 2 sem. hrs.

The capstone experience is a multifaceted assignment that serves as a culminating academic and intellectual experience for students. Capstone projects may take a wide variety of forms, but most are long-term investigative projects that culminate in a final product or presentation. Offered every fall and spring.