BIOCHEMISTRY (BCH)

Courses and Descriptions

BCH 225 Introduction to Organic and Biochemistry 4 Credits
An introductory course describing the basic principles of organic chemistry and biochemistry as they relate to human metabolism and disease. The nature of the chemical structure and reactivity of organic functional groups such as alcohols, aldehydes, ketones, carboxylic acids and amines will be presented with biological processes in mind. The biochemistry of the macromolecules DNA, RNA, proteins, carbohydrates and lipids will be discussed leading to a discussion of some of the more important metabolic pathways. This course is intended for science majors who do not take the full two semester sequence of organic chemistry and two semesters of biochemistry and desire a background in biochemistry. Non-science major students who have had one semester of general chemistry and one semester of biology may also enroll in the course. Three hours of lecture and one three-hour lab per week. Prerequisite(s): (CHE 110 with a minimum grade of D and CHE 110L) or (CHE 122 with a minimum grade of D and CHE 123 with a minimum grade of D) and BIO 115 with a minimum grade of D
Corequisite(s): BCH 225L.

BCH 225L Introduction to Organic & Biochemistry Lab 0 Credits
This lab is a co-requisite and must be taken with the corresponding course. Prerequisite(s): (CHE 110 UG D and CHE 110L) or (CHE 122 UG D and CHE 123) and BIO 115.
Corequisite(s): BCH 225.

BCH 325 Biochemistry 3 Credits
Outlines the chemistry and biological function of carbohydrates, proteins, lipids, nucleic acids, vitamins, and enzymes, and introduces enzyme kinetics and biological energetics. Degradative metabolic pathways of carbohydrates and lipids, and their controlled interrelationships are discussed in detail.
Prerequisite(s): CHE 122, CHE 214 with a minimum grade of D.

BCH 326 Biochem and Enzymology I Lab 1 Credits
The laboratory work illustrates techniques and methods essential to the biochemist. Methods for quantification of proteins, purification of enzymes and determination of their kinetic parameters, polarimetry, and structure proof of carbohydrates. The lab must be taken concurrently with BCH 325 by biochemistry and biology majors, but is optional for others.
Prerequisite(s): CHE 123, CHE 214.

BCH 330 Biochemistry II 3 Credits
Continuation of Biochemistry I. Includes molecular analysis of biological membrane structure and function and a molecular level analysis of information flow from DNA through RNA to proteins. Other topics include mechanisms of hormone action and an expansion on metabolic concepts.
Prerequisite(s): BCH 325.

BCH 331 Biochemistry II Lab 1 Credits
Methods of protein analysis, building on techniques and principles learned in BCH 326. Students will use bioinformatics and molecular biological techniques, including PCR, to harness and change protein sequence. They will implement modern protein purification techniques, develop enzyme essays, and perform equilibrium binding assays to investigate the relationships among protein sequence, structure, and function.
Prerequisite(s): BCH 326, BIO 117.

BCH 400 Advanced Biochemistry 3 Credits
Continuation of Biochemistry I. Includes molecular analysis of biological membrane structure and function and a molecular level analysis of information flow from DNA through RNA to proteins. Other topics include mechanisms of hormone action and an expansion on metabolic concepts.
Prerequisite(s): BCH 325.

BCH 410 Metabolism and Bioenergetics 3 Credits
An examination of principles of energetics and chemical transformations as they pertain to metabolism. Students will explore general issues of bioenergetics and will delve into biochemical pathways of catabolism and anabolism of biological molecules, including key nutrients, and xenobiotic compounds, including drugs and toxins. Attention will be placed on the enzymes and cofactors that mediate critical metabolic transformations, and students will use the scientific literature to investigate mechanisms of regulation and integration of metabolic pathways as well as consequences of aberrant enzyme function to human disease.
Prerequisite(s): BCH 325.

BCH 415 Signal Transduction 3 Credits
Cells in multicellular organisms are in constant communication with each other. One way that cells communicate is through the sharing of chemical signals through a process called “signal transduction.” In this course, we will study the basic biochemical principles of signal transduction to better understand life on a molecular level. Topics to be covered include a broad overview of signal transduction mechanisms, including basic receptor theory and the use of second messengers; investigations into specific signaling strategies, including signaling via receptor ion channels, G protein-coupled receptors, and nuclear hormone receptors; and examinations of cellular mechanisms used to coordinate signaling spatially and temporally. Special focus will be placed on roles of signal transduction pathways in health and disease.
Prerequisite(s): BCH 325.

BCH 425 Medicinal Chemistry 3 Credits
A comprehensive description of the important principles of medicinal chemistry including principles of rational drug design with synthetic strategies, mechanisms of drug actions, structure-activity relationships, the absorption, distribution, metabolism and elimination of drugs. Specific classes of drugs to be discussed include: anticancer agents, analgesics, anti-inflammatory drugs, steroids, drugs acting on the nervous system and antibiotics.
Prerequisite(s): BCH 325 or permission of instructor.

BCH 430 Advanced Lab Techniques in Biochemistry 1 Credits
Methods of protein analysis, building on techniques and principles learned in BCH 326. Students will use bioinformatics and molecular biological techniques, including PCR, to harness and change protein sequence. They will implement modern protein purification techniques, develop enzyme essays, and perform equilibrium binding assays to investigate the relationships among protein sequence, structure, and function.
Prerequisite(s): BCH 326.

BCH 490 Independent Study: Research and Creative Expression 1-4 Credits
Immerses the student in laboratory research. The student learns to organize material, use the literature, make precise measurement, and obtain reproducible data. If possible, the student will publish the results or present them at a scientific meeting.

BCH 491 Internship in Biochemistry 1-4 Credits
A supervised research experience in an approved organization where qualified students gain real-world knowledge and utilize their academic training in a professional environment. Placement may be in private, public, non-profit or governmental organizations under the guidance of a mentor. The mentor and student will have regular consultation with the departmental internship coordinator to assess the student's progress. Normally, 50 hours of internship per credit is required. The grade for the course will be determined by the students' overall performance in their research work, a research paper documenting their work with their internship mentor and an oral or poster presentation at the end of the semester.
Prerequisite(s): 2.5 GPA and permission of the instructor.