

BCH - Biochemistry

BCH 104RN The Biochemistry of Health for Non-Science Majors: 4 Credits (3 Lec, 1 Lab)

Introduction for non-science majors to the biochemical basis of nutrition, health, DNA, and the human genome. The class and laboratory includes training for in depth searching of Internet and library information resources, evaluating and presenting the information found, and an introduction to DNA fingerprinting.

BCH 194 Seminar/Workshop: 1 Credits (1 Other)

For the new student. Integration into the department and campus community. Scientific communication and chemical literature searching skills. Cross-listed with CHMY 194.

BCH 290R Undergraduate Research: 1-6 Credits (1-6 Other)

PREREQUISITE: Consent of instructor. Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research. May be repeated

Repeatable up to 6 credits.

BCH 292 Independent Study: 1-3 Credits (1-3 Other)

PREREQUISITE: Consent of instructor and approval of department head. Directed research and study on an individual basis

Repeatable up to 6 credits.

BCH 294 Seminar/Workshop: 1 Credits (1 Other)

PREREQUISITE: CHMY 194 or BCH 194. Introduces students to faculty research and departmental research facilities, with the goal of assisting students in the process of joining a research group. Issues related to becoming engaged in a research groups including how to keep a research notebook, lab safety, ethics, etc. are also considered. Cross-listed with CHMY 294

Repeatable up to 4 credits.

BCH 380 Biochemistry: 4 Credits (4 Lec)

PREREQUISITE: BIOB 160 or BIOB 260, and CHMY 211 or CHMY 323 or CHMY 333. Carbohydrate, lipid, protein, and nucleic acid structure and function; enzyme kinetics; energetics; major metabolic pathways for carbohydrates, lipids, and amino acids; photosynthesis; regulation of gene function

BCH 381 Biochemistry Lab: 1 Credits (1 Lab)

The lab to accompany BCH 380. This course runs concurrent with BCH 380. Both courses are required to be taken during the same semester.

BCH 394 Seminar/Workshop: 1 Credits (1 Other)

PREREQUISITE: CHMY 294 or BCH 294. Developing student presentation skills thru the preparation and presentation of a group 50-minute talk on a chemical topic of current interest. Career planning and resume preparation. Cross-listed with CHMY 394

BCH 441 Biochemistry of Macromolecules: 3 Credits (3 Lec)

PREREQUISITE: BIOB 160 or BIOB 260 and CHMY 323 or CHMY 333. Biochemical basis of modern molecular biology; structure and function of proteins, nucleic acids, and membranes; replication; transcription; translation; regulation of gene expression; and recombinant DNA

BCH 442 Metabolic Regulation: 3 Credits (3 Lec)

PREREQUISITE: BIOB 160 or BIOB 260 and CHMY 323 or CHMY 333. In-depth biochemical treatment of metabolism and its regulation in cellular processes. Offered in both Fall and Spring semesters

BCH 444R Biochemistry & Molecular Biology Methods: 3 Credits (1 Lec, 2 Lab)

PREREQUISITE: BCH 441 or consent of instructor. This course focuses on molecular biology/biochemistry procedures integral to current research. Methods include PCR; gene cloning; DNA sequencing; and expression, isolation, purification, and characterization of the gene-encoded protein

BCH 446 Metabolomics and Systems Biology: 3 Credits (3 Lec)

PREREQUISITE: BCH 441, BCH 442, M171Q, M172Q The course will cover the language, methods and scientific literature surrounding metabolomics and systems biology and examples of applications to understanding mechanisms in health and disease. Students will increase their understanding of biological circuits and feedback regulation with emphasis on changes in metabolism that are close to phenotype in health and disease. Students will become familiar with the most recent scientific literature on metabolomics and systems biology that is relevant to understanding biological mechanisms of interest to them

BCH 450 X-Ray Crystallography: 3 Credits (3 Lec)

PREREQUISITES: M 172 COREQUISITES: CHMY 323 or BCH 380 or BCH 441 or PHSX 224 or instructor's approval. This course focuses on the theory of small and macromolecular structure determination by x-ray crystallography. Topics include crystallization of small and macromolecules, and molecular structure determination from single crystal X-ray diffraction data, including model building, refinement and validation. Co-Convened with BCH 550

BCH 490R Undergraduate Research: 1-6 Credits (1 Other)

PREREQUISITE: Consent of instructor. Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research. May be repeated

Repeatable up to 12 credits.

BCH 491 Special Topics: 1-4 Credits (1-4 Lec)

PREREQUISITE: Course prerequisites as determined for each offering. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number

Repeatable up to 12 credits.

BCH 492 Independent Study: 1-6 Credits (1-6 Other)

PREREQUISITE: Junior standing, consent of instructor, and approval of department head. Directed research and study on an individual basis

Repeatable up to 6 credits.

BCH 494 Seminar/Workshop: 1 Credits (1 Other)

PREREQUISITE: CHMY 394 or BCH 394. Senior capstone course. Taught in collaboration with departmental Honors Thesis, CHMY 499. The chemistry/biochemistry research undergraduate experience constitutes a synthesis of our (bio)chemistry class room and laboratory education. The projects are orally presented in seminar form, discussed on the basis of acquired knowledge, and analyzed using stringent scientific methods and criteria. A complete personal resume is prepared. May be repeated once. Cross-listed with CHMY 494

BCH 499 Senior Thesis/Capstone: 1 Credits (1 Other)

PREREQUISITE: CHMY 490R AND (BCH 394 OR CHMY 394). Senior capstone course. Taught in collaboration with departmental Honors Thesis, CHMY 499. The chemistry/biochemistry research undergraduate experience constitutes a synthesis of our (bio)chemistry class room and laboratory education. The projects are orally presented in seminar form, discussed on the basis of acquired knowledge, and analyzed using stringent scientific methods and criteria. A complete personal resume is prepared. May be repeated once. Cross-listed with CHMY 499

BCH 524 Mass Spectrometry: 3 Credits (3 Lec)

PREREQUISITE: CHMY 323 or CHMY 301. Mass spectrometric methods of analysis. Methods for ionization of samples in the gas, liquid and solid phases. Proteomics applications. Cross referenced with CHMY 524

BCH 526 Adv Protein NMR Spectroscopy: 3 Credits (3 Lec)

PREREQUISITE: CHMY 323. This lecture-based course is designed to teach the fundamental principles of nuclear magnetic resonance (NMR) spectroscopy as it applies to the structural elucidations of proteins in solution. Pre-requisites include familiarity with linear algebra and basic trigonometric functions and CHMY 323. Cross-referenced with CHMY 526

BCH 543 Proteins: 3 Credits (3 Lec)

PREREQUISITE: BCH 441. Structure-function relationships of proteins and enzymes. Current literature stressed. Written student reports required

BCH 544 Molecular Biology: 3 Credits (3 Lec)

PREREQUISITE: BCH 441, BIOB 425, BIOB 410 or comparable course. Recent advances in understanding and research methods using both eukaryotic and prokaryotic systems

BCH 545 Advanced Physical Biochemistry: 3 Credits (3 Lec)

PREREQUISITE: CHMY 324 AND BCH 441. Theoretical presentation of the molecular structures and interactions occurring in proteins and nucleic acids. Discussion of spectroscopy techniques used to study bio molecular structures and function. Includes concepts in: Nuclear Magnetic Resonance, X-ray Diffraction, Ultraviolet Absorption, Fluorescence, Circular Dichroism, Vibrational Spectroscopy, molecular motion and transport properties including diffusion, sedimentation, and viscosity

BCH 546 Metabolomics and Systems Biology: 3 Credits (3 Lec)

The course will cover the language, methods and scientific literature surrounding metabolomics and systems biology and examples of applications to understanding mechanisms in health and disease. Students will increase their understanding of biological circuits and feedback regulation with emphasis on changes in metabolism that are close to phenotype in health and disease. Students will become familiar with the most recent scientific literature on metabolomics and systems biology that is relevant to understanding biological mechanisms of interest to them.

BCH 547 Bioinorganic Chemistry: 3 Credits (3 Lec)

PREREQUISITE: CHMY 401 AND BCH 441. This course provides an introduction and overview of the field of bioinorganic chemistry, the chemistry of metals in biological systems, with a particular emphasis on metal trafficking, metal center assembly and metal clusters in biology

BCH 550 X-ray Crystallography: 3 Credits (3 Lec)

PREREQUISITE: BCH 441 and BCH 442 or the equivalent and M 182M. This course focuses on theory and practice of molecular structure determined by x-ray crystallography. Topics include crystallization of macromolecules, molecular structure determination from x-ray data, and evaluation of the quality of the resulting macromolecular models. Co-Convened with BCH 450

BCH 553 Protein Structure, Function, and Evolution: 3 Credits (3 Lec)

PREREQUISITE: BCH 543. Focus is on the integration of results from multiple experimental approaches, including activity assays, kinetics, thermodynamics, bioinformatics, molecular evolution, protein structure and protein dynamics. Students will draw upon the primary literature to gather and integrate relevant results to derive detailed composite models for how specific proteins function

BCH 575 Professional Paper: 1-6 Credits (1-6 Other)

PREREQUISITE: Consent of instructor. A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee. Cross-listed with CHMY 575
Repeatable up to 6 credits.

BCH 590 Master's Thesis: 1-10 Credits (1-10 Other)

PREREQUISITE: Master's standing
Repeatable up to 99 credits.

BCH 591 Metabolomics and Systems Biology: 3 Credits (3 Lec)

PREREQUISITE: Biochemistry and metabolism at the 400 level or the consent of the instructor. This class will offer a broad foundation of metabolomic techniques, including isotopic labeling methodologies, and will learn how integrate the metabolomics information into systems biology models of metabolism in health and disease

BCH 592 Independent Study: 1-3 Credits (1 Other)

PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies. Directed research and study on an individual basis
Repeatable up to 3 credits.

BCH 594 Seminar: 1 Credits (1 Other)

PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined by petition. Course prerequisites as determined for each offering. Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material. May be repeated. Cross-listed with CHMY 594
Repeatable up to 99 credits.

BCH 689 Grad Research/Instruction: 1-3 Credits (1-3 Lec)

PREREQUISITE: Graduate standing
COREQUISITE: BCH 590 or BCH 690. Classroom instruction associated with directed graduate research/creative activity projects

Repeatable up to 3 credits.

BCH 690 Doctoral Thesis: 1-10 Credits (1-10 Other)

PREREQUISITE: PhD standing
Repeatable up to 99 credits.