BCH - Biochemistry

BCH 104RN. The Biochemistry of Health for Non-Science Majors. 4 Credits. (3 Lec, 1 Lab) S
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 Credit. (1 Sem) F
For the new student. Integration into the department and its research and educational program. Scientific communication and chemical literature searching skills.

BCH 290R. Undergraduate Research. 1-6 Credits. (1-6 Ind; 6 cr max) F,S
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.

BCH 292. Independent Study. 1-3 Credits. (1-3 Ind; 6 cr max) On Demand
PREREQUISITE: Consent of instructor and approval of department head. Directed research and study on an individual basis.

BCH 294. Seminar/Workshop. 1 Credit. (1 Sem; 4 cr max) S
PREREQUISITE: CHMY 194 or BCH 194. Introduction to faculty research through faculty mini seminars. Departmental research facilities. Research groups: Research planning decisions (MSU laboratory, summer internship, student exchange, RBU, USC, etc.).

BCH 380. Biochemistry, 5 Credits. (4 Lec, 1 Lab) F,S,Su
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 394. Seminar/Workshop. 1 Credit. (1 Sem) F
PREREQUISITE: CHMY 294 or BCH 294. Research techniques, procedures, and reports. Seminar reporting and presentation skills. Career planning and resume preparation. May be repeated once.

BCH 441. Biochemistry of Macromolecules. 3 Credits. (3 Lec) F
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) F
PREREQUISITE: BCH 441 or consent of instructor. In-depth biochemical treatment of metabolism and its regulation in cellular processes.

BCH 444R. Biochemistry & Molecular Biology Methods. 3 Credits. (1 Lec, 2 Lab) S
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 450. X-Ray Crystallography, 3 Credits. (3 Lec) S
PREREQUISITE: 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.

BCH 490R. Undergraduate Research. 1-6 Credits. (1 Ind; 12 cr max) F,S,Su
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.

BCH 491. Special Topics. 1-4 Credits. (1-4 Ind; 12 cr max) On Demand
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.

BCH 492. Independent Study. 1-3 Credits. (1-3 Ind; 6 cr max) On Demand
PREREQUISITE: Junior standing, consent of instructor, and approval of department head. Directed research and study on an individual basis.

BCH 494. Seminar/Workshop. 1 Credit. (Sem) F(S)
PREREQUISITE: 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.

BCH 499. Senior Thesis/Capstone. 1 Credit. (1 Lec) S
PREREQUISITE: CHMY 300 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.

BCH 524. Mass Spectrometry. 3 Credits. (3 Lec) F alternate years, to be offered odd years.

BCH 526. Adv Protein NMR Spectroscopy. 3 Credits. (3 Lec) F alternate years, to be offered even years.
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) F alternate years, to be offered odd years.

BCH 544. Molecular Biology. 3 Credits. (3 Lec) F alternate years, to be offered even years.
PREREQUISITE: BCH 441, BIOI 425, BIOI 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) S alternate years, to be offered even years.
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 547. Bioinorganic Chemistry. 3 Credits. (3 Lec) F alternate years, to be offered odd years.
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) S alternate years, to be offered even years.
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 small and macromolecules, molecular structure determination from single crystal x-ray diffraction data, and evaluation of the quality of the resulting macromolecular models.

BCH 575. Professional Paper. 1-6 Credits. (1-6 Ind; 6 cr max) F,S
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.

BCH 590. Master's Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S
PREREQUISITE: Master's standing.

BCH 591. Special Topics. 1-4 Credits. (1-4 Ind; 12 cr max) On Demand
PREREQUISITE: Upper division courses and others 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.
BCH 592. Independent Study, 1-3 Credits. (1 Ind; 3 cr max) On Demand
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies. Directed research and study on an individual basis.

BCH 594. Seminar, 1 Credit. (1 Sem; max unlimited) F,S
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.

BCH 689. Grad Research/Instruction, 1-3 Credits. (1-3 Lec; 3 cr max) F,S,Su
PREREQUISITE: Graduate standing. COREQUISITE: BCH 590 or BCH 690. Classroom instruction associated with directed graduate research/creative activity projects.

BCH 690. Doctoral Thesis, 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su
PREREQUISITE: PhD standing.