BCH 441R. Undergraduate Research. 1-6 Credits. (1 Ind; 12 cr max) FS,Su
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.

BCH 491. Special Topics. 1-4 Credits. (1-4 Lec; 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. 1-6 Credits. (1-6 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. (1 Sem) FS
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 499.

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, BIOG 425, BIOG 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 546. Metabolomics and Systems Biology. 3 Credits. (3 Lec) S
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) 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 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) S 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 Ind; 6 cr max) ES 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.

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

BCH 591. Special Topics. 1-4 Credits. (1-4 Lec; 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) ES 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.

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.