

# BCH - Biochemistry

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## Biochemistry: BCH

### Lower-Division Courses

#### BCH 206K. Undergraduate Research.

Introduction to research practices; supervised individual undergraduate research in biochemistry. Six to ten laboratory hours a week for one semester. May be taken for a letter grade no more than twice. No more than six semester hours may be counted toward a degree in biochemistry. May be repeated for credit.

#### BCH 115T, 215T, 315T, 415T, 515T, 615T, 715T, 815T, 915T. Special Topics in Biotechnology.

Explore recent development and research methods in biotechnology and biomanufacturing. For each semester hour of credit earned, one lecture hour a week for one semester. May be repeated for credit when the topics vary.

#### BCH 219L. Introduction to Biochemical Laboratory Practices and Skills.

Explore basic skills used by biochemists and an introduction to future career options. Examine basic biochemical concepts and laboratory, computational, and professional skills. Four laboratory hours and one lecture hour a week for one semester. Prerequisite: Biology 311D and Chemistry 302 with a grade of at least C- and credit or registration for Chemistry 204.

#### BCH 119S, 219S, 319S, 419S, 519S, 619S, 719S, 819S, 919S. Topics in Biochemistry.

This course is used to record credit the student earns while enrolled at another institution in a program administered by the University's Study Abroad Office. Credit is recorded as assigned by the study abroad adviser in the Department of Chemistry and Biochemistry. University credit is awarded for work in an exchange program; it may be counted as coursework taken in residence. Transfer credit is awarded for work in an affiliated studies program. May be repeated for credit when the topics vary.

### Upper-Division Courses

#### BCH 129S, 229S, 329S, 429S, 529S, 629S, 729S, 829S, 929S. Topics in Biochemistry.

This course is used to record credit the student earns while enrolled at another institution in a program administered by the University's Study Abroad Office. Credit is recorded as assigned by the study abroad adviser in the Department of Chemistry and Biochemistry. University credit is awarded for work in an exchange program; it may be counted as coursework taken in residence. Transfer credit is awarded for work in an affiliated studies program. May be repeated for credit when the topics vary.

#### BCH 330M. Medical Biochemistry.

Apply the principles of biochemistry to medicine and physiology to gain an understanding of organ function and regulating metabolite homeostasis. Three lecture hours a week for one semester. Biochemistry 330M and 339P may not both be counted. Prerequisite: Biochemistry 339F or 369 with a grade of at least C-.

#### BCH 339F. Foundations of Biochemistry.

Restricted to biochemistry majors. Metabolism of carbohydrates, lipids, amino acids, and nucleotides; structure and function of proteins. Three lecture hours a week for one semester. Only one of the following may be counted: Biochemistry 339F, 369, Biology 337 (Topic: Foundations of

Biochemistry), Chemistry 339K, 369. Prerequisite: One of the following with a grade of at least C-: Chemistry 310M, 318M, 320M, 328C, or 328M.

#### BCH 339J. Chemical and Synthetic Biology.

Topics include enzymatic reaction mechanisms and how they can be manipulated using tools from both chemistry and molecular biology. Designed for students pursuing pharmaceutical and biotechnology careers. Three lecture hours a week for one semester. Only one of the following may be counted: Biochemistry 339J, Chemistry 339J, Systems and Synthetic Biology 339J. Prerequisite: Biology 344 and Biochemistry 339F with a grade of at least C-.

#### BCH 339M. Structure and Function of Molecular Machines.

Function of proteins and protein complexes as machines in the cell, including the interaction of proteins with nucleic acids, synthesis of proteins, and degradation of proteins. Three lecture hours per week for one semester. Prerequisite: Biochemistry 339F, 370, and Biology 344 with a grade of at least C-.

#### BCH 339N. Systems Biology and Bioinformatics.

Understanding how the cell works as a system with emphasis on the methods used to gather and analyze data and develop/test models of systems level data. Three lecture hours a week for one semester. Biochemistry 339N and 364C may not both be counted. Prerequisite: Biology 344, Biochemistry 339F, Statistics and Data Sciences 320E, and Computer Science 303E with a grade of at least C-; or equivalent programming experience with approval of instructor.

#### BCH 339P. Biochemistry in Physiology and Medicine.

Explore the fundamentals of physiology and medicine to understand how the body functions and maintains homeostasis through the principles of biochemistry. Three lecture hours a week for one semester. Biochemistry 330M and 339P may not both be counted. Prerequisite: Biochemistry 339F with a grade of at least C-.

#### BCH 147, 247, 347, 447. Topics in Biochemistry.

Explore recent developments and research methods in biochemistry. For each semester hour of credit earned, the equivalent of one lecture hour a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Biochemistry 339F with a grade of at least C; additional prerequisites vary with the topic.

#### BCH 364C. Bioinformatics.

Examine typical data, data analysis, and algorithms encountered in computational biology. Includes introductory probability and statistics, basics of programming, protein and nucleic acid sequence analysis, genome sequencing and assembly, synthetic biology, analysis of large-scale gene expression data, data clustering, biological pattern recognition, and biological networks. Three lecture hours a week for one semester. Biochemistry 339N and 364C may not both be counted. Prerequisite: Biochemistry 339F with a grade of at least B; Computer Science 303E or the equivalent; Statistics and Data Sciences 328M or 320E and 348 or 322E with a grade of at least B; and consent of the instructor.

#### BCH 364D. Macromolecular Structure Determination.

Restricted to biochemistry majors. Theory of physical methods used in biochemistry and molecular biology, with a strong emphasis on macromolecular structure determination by X-ray crystallography and cryo-electron microscopy. Includes surface plasmon resonance, isothermal titration calorimetry, and biolayer interferometry. Three lecture hours a week for one semester. Biochemistry 364D and Chemistry 364D may not both be counted. Prerequisite: Biochemistry 339F and 370 with a grade of at least B and consent of instructor.

### **BCH 364E. Systems Biology.**

Restricted to biochemistry majors. Survey of current high-throughput technologies and computational methods for generating data and integrating information at all levels of biological organization. Emphasis on how hypotheses can be generated and tested with these techniques to better understand how model organisms function and evolve. Three lecture hours a week for one semester. Biochemistry 364E and Chemistry 364E may not both be counted. Prerequisite: Biochemistry 339F with a grade of at least B and consent of instructor.

### **BCH 364F. Astrobiology.**

Restricted to biochemistry majors. An overview of the science used in the search for extraterrestrial life, life origins, earth history, evolution, metabolism of extremophiles, biochemistry, and astronomy. Three lecture hours a week for one semester. Prerequisite: Biochemistry 339F with a grade of at least B.

### **BCH 365D. Structure and Function of Proteins and Nucleic Acids.**

Restricted to biochemistry majors. Exploration of the structures and functions of proteins and nucleic acids, utilizing quantitative methods to evaluate the roles of structural features in function, and developing new ways of thinking about the dynamics of macromolecules. Three lecture hours a week for one semester. Biochemistry 365D and Chemistry 365D may not both be counted. Prerequisite: Biochemistry 339F and 370 with a grade of at least B.

### **BCH 168C, 268C, 368C, 468C. Topics in Biochemistry.**

Supervised study of selected topics in Biochemistry by individual arrangement with the instructor. For each semester hour of credit earned, the equivalent of one lecture hour a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Biochemistry 339F with a grade of at least B and consent of instructor.

### **BCH 368R. Supervised Capstone Research.**

Perform supervised independent research and write a capstone thesis on a selected subject in Biochemistry by individual arrangement with the instructor. Three lecture hours a week for one semester. Prerequisite: Biochemistry 370 with a grade of at least C, concurrent registration in Biochemistry 175C, consent of instructor, and consent of the capstone thesis advisor.

### **BCH 368W. Supervised Literature Review.**

Perform a supervised literature review and write a capstone thesis on a selected subject in Biochemistry by individual arrangement with the instructor. Three lecture hours a week for one semester. Prerequisite: Biochemistry 370 with a grade of at least C, concurrent registration in Biochemistry 175C, consent of instructor, and consent of the capstone thesis advisor.

### **BCH 369. Fundamentals of Biochemistry.**

The basics of protein structure and function, carbon and nitrogen metabolism, and molecular biology of macromolecules. Three lecture hours a week for one semester. Only one of the following may be counted: Biochemistry 339F, 369, Biology 337 (Topic: Foundations of Biochemistry), Chemistry 339K, 369. May not be counted toward a degree in biochemistry. Prerequisite: One of the following with a grade of at least C-: Chemistry 310M, 318M, 328C, 320M, or 328M.

### **BCH 369K. Techniques of Research.**

Advanced laboratory practice and introduction to research. One lecture hour and six laboratory hours a week for one semester. May be taken for a letter grade no more than twice. No more than six semester hours may be counted toward a degree in biochemistry. May be repeated for credit. Prerequisite: Six semester hours of upper-division coursework

in biochemistry or chemistry, or five semester hours of coursework in organic chemistry, or consent of the undergraduate faculty adviser in biochemistry.

### **BCH 369L. Biochemistry Laboratory.**

An introduction to modern fundamental techniques of biochemistry. Two lecture hours and seven laboratory hours a week for one semester. Biochemistry 369L and Chemistry 369L may not both be counted. Prerequisite: Biochemistry 339F with a grade of at least C-.

### **BCH 369T. Biotechnology Laboratory.**

Advanced techniques in biotechnology. Nine laboratory hours a week for one semester. Biochemistry 369T and Chemistry 369T may not both be counted. Prerequisite: Consent of instructor.

### **BCH 370. Physical Methods of Biochemistry.**

Theory of electrophoresis, ultracentrifugation, spectroscopy, electron microscopy, and diffraction as applied to biological macromolecules. Three lecture hours a week for one semester. Biochemistry 370 and Chemistry 370 may not both be counted. Prerequisite: Biochemistry 339F with a grade of at least C-.

### **BCH 175C. Biochemistry Capstone Seminar.**

Receive guidance during capstone experience. Document and reflect on the experience, present capstone work in a professional venue, and discuss plans for transitioning to post-graduation careers. The equivalent of one lecture hour a week for one semester. Prerequisite: Concurrent registration in Biochemistry 368R or 368W.

### **BCH 379H, 679H. Biochemistry Honors Tutorial Course.**

Laboratory research project in a specific field of biochemistry under the supervision of one or more faculty members. Conference course. May be repeated once for credit. Must be taken in addition to the required hours for a degree in biochemistry. Students must enroll no later than the first semester of the year of graduation. May be repeated for credit. Prerequisite: Consent of the research supervisor and the departmental honors adviser.

## **Graduate Courses**

### **BCH 080M. Dual MD/PhD Program with UT Medical Branch.**

Preclinical medical study at the University of Texas Medical Branch at Galveston. May not be taken concurrently with another course at the University of Texas at Austin. Prerequisite: Graduate standing and admission to the MD/PhD dual degree program in biochemistry.

### **BCH 387D. Physical Methods in Biochemistry and Molecular Biology.**

Theory of physical methods used in biochemistry and molecular biology. Three lecture hours a week for one semester. Prerequisite: Graduate standing, an undergraduate course in physical chemistry, and an undergraduate course in biochemistry.

### **BCH 190C, 290C. Topics in Biochemistry.**

Discuss current topics in biochemistry. For each semester hour of credit earned, one lecture hour a week for one semester. May be repeated for credit when the topics vary. Prerequisite: Graduate standing and consent of instructor.

### **BCH 394. Structure and Function of Proteins and Nucleic Acids.**

Explores the structures and functions of proteins and nucleic acids. Emphasis is placed on quantitative methods used to evaluate the roles of structural features in function and in developing new ways of thinking about the dynamics of macromolecules. Three lecture hours a week for

one semester. Biochemistry 394 and Chemistry 394 may not both be counted. Prerequisite: Graduate standing.

#### **BCH 394P. Bioinformatics.**

Examine typical data, data analysis, and algorithms encountered in computational biology. Includes introductory probability and statistics, basics of programming, protein and nucleic acid sequence analysis, genome sequencing and assembly, synthetic biology, analysis of large-scale gene expression data, data clustering, biological pattern recognition, and biological networks. Three lecture hours a week for one semester. Prerequisite: Graduate standing.

#### **BCH 395F. Advanced Biochemistry.**

Same as Biology 395I and Molecular Biology 395I. Explore advanced biochemistry concepts and the scientific process. Consider the structure and function of proteins, carbohydrates, lipids and nucleic acids, and discuss enzyme mechanisms and kinetics. Three lecture hours a week for one semester. Only one of the following may be counted: Biochemistry 395F, 395G, Biology 395I, 395G, Molecular Biology 395I, 395G. Prerequisite: Graduate standing; a one-year undergraduate sequence in biochemistry is strongly recommended.

#### **BCH 395G. Structure and Function of Proteins and Membranes.**

Same as Biology 395G and Molecular Biology 395G. Explore advanced biochemistry concepts and the scientific process. Examine a detailed consideration of the structure and function of proteins, carbohydrates, lipids and nucleic acids, as well as discussion of enzyme mechanisms and kinetics. Three lecture hours a week for one semester. Only one of the following may be counted: Biochemistry 395F, 395G, Biology 395I, 395G, Molecular Biology 395I, 395G. Prerequisite: Graduate standing; a one-year undergraduate sequence in biochemistry is strongly recommended.

#### **BCH 395J. Genes, Genomes, and Gene Expression.**

Same as Biology 395J and Molecular Biology 395J. Detailed consideration of prokaryotic and eukaryotic mechanisms of DNA replication and transcription; posttranscriptional processing of transcription products; and mechanism and regulation of the translation of messenger RNAs. Three lecture hours a week for one semester. Only one of the following may be counted: Biochemistry 395J, Biology 395J, Molecular Biology 395J. Prerequisite: Graduate standing; and Biology 395F and 395G, or Chemistry 395F and 395G, or Molecular Biology 395F and 395G, or consent of instructor.

#### **BCH 396S. Synthetic Biology.**

Survey of current high-throughput technologies and computational methods for generating data and integrating information at all levels of biological organization. Emphasis on how hypotheses can be generated and tested with these techniques to better understand how model organisms function and evolve. Three lecture hours a week for one semester. Prerequisite: Graduate standing.

#### **BCH 197C, 297C, 397C, 497C, 597C, 697C, 997C. Advanced Study and Research in Biochemistry.**

For each semester hour of credit earned, the equivalent of one-and-one-half laboratory hours a week for one semester. May be repeated for credit. Offered on the credit/no credit basis only. Prerequisite: Graduate standing and consent of graduate adviser.

#### **BCH 698. Thesis.**

The equivalent of three lecture hours a week for two semesters. Offered on the credit/no credit basis only. Prerequisite: For 698A, graduate

standing in biochemistry and consent of the graduate adviser; for 698B, Biochemistry 698A.

#### **BCH 398T. Professional Development for Graduate Students in Biochemistry.**

Restricted to graduate students in biochemistry. Provides professional development skills to graduate students in biochemistry. Subjects include excellence in teaching, scientific communication, grantsmanship, ethics, and career planning. Three lecture hours a week for one semester. Biochemistry 398T and Chemistry 398T may not both be counted. Offered on the credit/no credit basis only. Prerequisite: Graduate standing in biochemistry.

#### **BCH 399W, 699W, 999W. Dissertation.**

May be repeated for credit. Offered on the credit/no credit basis only. Prerequisite: Admission to candidacy for the doctoral degree.

### **Professional Courses**