BIOCHEMISTRY, MOLECULAR & CELLULAR BIOLOGY (BMCB)

# Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

**BMCB 401 - Professional Perspectives in Biochemistry, Molecular and Cellular Biology**

**Credits:** 1

Introduction to the fields of biochemistry, molecular and cellular biology. Explores professional opportunities for BMCB majors. Guest speakers from on- and off-campus present seminars and lead discussions on contemporary issues in subject area. Development of strategies for achieving professional goals. Cr/F.

**Grade Mode:** Credit/Fail

**BMCB #405 - Biotechnology Research Internship**

**Credits:** 2

A 4-week (minimum) experiential learning internship in which students conduct independent laboratory-based research in an area of shared interest with a faculty mentor in the College of Life Sciences and Agriculture. Students gain first-hand experience conducting original research, incorporating direct observation, reflection, evaluation, and discussion. Permission required. Open to high school students only.

**Grade Mode:** Credit/Fail

**BMCB 501 - Biological Chemistry**

**Credits:** 4

Survey of the molecular basis of life with a focus on the mechanisms of biochemical reactions in metabolic pathways, beginning with an overview of functional groups and organic reactions relevant for living organisms. Bioenergetics of carbohydrate, lipid, and nitrogen metabolic pathways. Prereq: CHEM 403 and CHEM 404, or CHEM 411.

**Mutual Exclusion:** No credit for students who have taken BMCB 658, BMCB 751, BMCB 752.

**Grade Mode:** Letter Grade

**BMCB 605 - Principles of Cell Biology**

**Credits:** 4

Cell and developmental biology of multicellular eukaryotic organisms. Structure and function of major cellular compartments; mechanisms of cellular communication and dynamics; embryonic development. Special topics: subcellular organization and function; membrane biogenesis; signal transduction; mitogenesis; apoptosis; autophagy; tumor suppressors and cell cycle regulation; cytokinesis; cytoskeletal dynamics; cellular shape and motility; stem cell biology; organogenesis; morphogenesis and patterning. Prereq: BIOL 411 and BIOL 412; CHEM 403 and CHEM 404.

**Equivalent(s):** BIOL 605, BSCI 735

**Grade Mode:** Letter Grade

**BMCB 658 - General Biochemistry**

**Credits:** 3

Comprehensive, introductory course emphasizing the cellular metabolism and the structure and function of proteins, nucleic acids, carbohydrates, and lipids. This course is intended for programs that do not require a biochemistry laboratory. Prereq: BIOL 411; CHEM 545 and CHEM 546, or CHEM 547 and CHEM 548, or CHEM 651 and CHEM 652.

**Equivalent(s):** BMCB 658

**Grade Mode:** Letter Grade

**BMCB 659 - General Biochemistry Lab**

**Credits:** 2

Structured laboratory experiments that provide training in analytical and preparative techniques fundamental to modern biochemistry and molecular biology. Coreq: BMCB 658. Special fee.

**Co-requisite:** BMCB 658

**Equivalent(s):** BCHM 659, BMCB 659W

**Grade Mode:** Letter Grade

**BMCB 659W - General Biochemistry Lab**

**Credits:** 2

Structured laboratory experiments that provide training in analytical and preparative techniques fundamental to modern biochemistry and molecular biology. Coreq: BMCB 658. Special fee. UNHM only. Writing intensive.

**Co-requisite:** BMCB 658

**Attributes:** Writing Intensive Course

**Equivalent(s):** BCHM 659, BMCB 659

**Grade Mode:** Letter Grade

**BMCB 750 - Physical Biochemistry**

**Credits:** 3

Structure, interactions, and physical-chemical properties of biomolecules. Thermodynamic, kinetic, and spectroscopic methods for the study of proteins and nucleic acids. Prereq: CHEM 547 and CHEM 549 and CHEM 548 and CHEM 550 or equivalent; MATH 424B or equivalent; or permission.

**Equivalent(s):** BCHM 750

**Grade Mode:** Letter Grade

**BMCB 751 - Principles of Biochemistry**

**Credits:** 4

In-depth survey of biochemistry: macromolecular structure; structure and function of proteins, nucleic acids, carbohydrates, and lipids; introduction to metabolic pathways. Prereq: CHEM 547 and CHEM 548, or CHEM 651 and CHEM 652; or permission.

**Equivalent(s):** BCHM 751

**Mutual Exclusion:** No credit for students who have taken BMCB 501.

**Grade Mode:** Letter Grade

**BMCB 752 - Principles of Biochemistry**

**Credits:** 4

In-depth survey of biochemistry: macromolecular structure; structure and function of proteins, nucleic acids, carbohydrates, and lipids; introduction to metabolic pathways. Prereq: CHEM 547 and CHEM 548, or CHEM 651 and CHEM 652; or permission.

**Equivalent(s):** BCHM 752

**Mutual Exclusion:** No credit for students who have taken BMCB 501.

**Grade Mode:** Letter Grade
BMCB 753 - Cell Culture  
Credits: 5  
Principles and technical skills fundamental to the culture of animal and plant cells, tissues, and organs. Introduction to the techniques of subculturing, establishing primary cultures, karyotyping, serum testing, cloning, growth curves, cryopreservation, hybridoma formation and monoclonal antibody production, and organ cultures. Application of cell culture to contemporary research in the biological sciences. Prereq: BMS 503 and 504. Special fee. Lab.  
Equivalent(s): ANSC 751, MICR 751, PBIO 751  
Grade Mode: Letter Grade

BMCB 754 - Molecular Biology Research Methods  
Credits: 5  
Theory and application of current technologies to manipulate DNA. Hands-on research experience that includes DNA isolation and quantitation methods, cloning, PCR, DNA sequencing, and analysis of gene products. Prereq: GEN 604. Special fee. Lab. Writing intensive.  
Attributes: Writing Intensive Course  
Equivalent(s): BCHM 754, BSCI 765, GEN 754, PBIO 754  
Grade Mode: Letter Grade

BMCB 755 - Laboratory in Biochemistry and Molecular Biology  
Credits: 5  
Application of modern techniques to the characterization and purification of biomolecules, with an emphasis on proteins and nucleic acids. Analysis of enzyme kinetics and basic techniques used in molecular biology. Prereq: BMCB 751 or permission. Special fee. Writing intensive.  
Attributes: Writing Intensive Course  
Equivalent(s): BCHM 755, BSCI 765, GEN 754, PBIO 754  
Grade Mode: Letter Grade

BMCB 760 - Pharmacology  
Credits: 4  
Introduction to the basic principles and fundamental concepts of pharmacology, with a focus on molecular mechanisms and pathological basis of therapeutics and their curative effects. Topics include: foundations of pharmacology including pharmacodynamics and pharmacogenomics; drugs affecting other systems; chemotherapeutic drugs. Prereq: BMCB 658 or BMCB 751, or permission.  
Mutual Exclusion: No credit for students who have taken BSCI 680.  
Grade Mode: Letter Grade

BMCB 763 - Biochemistry of Cancer  
Credits: 4  
Evaluation of the hallmarks of cancer, including molecular mechanisms of carcinogenesis, roles of oncogenes and dysregulated cell development, function and metabolism, tumor immunology, and the biological basis of cancer therapy. Prereq: BMCB 658 or BMCB 751 or permission.  
Equivalent(s): BCHM 763  
Grade Mode: Letter Grade

BMCB 790 - Undergraduate Teaching Experience  
Credits: 1-4  
Provide academic support to graduate teaching assistants or faculty in preparing, presenting, and executing Biochemistry, Molecular and Cellular Biology lectures or labs. Permission required.  
Repeat Rule: May be repeated for a maximum of 4 credits.  
Grade Mode: Letter Grade

BMCB 794 - Protein Structure and Function  
Credits: 4  
Analysis of how the three-dimensional architecture of soluble and membrane proteins contributes to their biochemical function; methods for determining the structure of proteins; protein folding; protein targeting; mechanisms of enzyme catalysis. Computer resources used for protein modeling and structural prediction. Prereq: BMCB 658 or BMCB 751 or permission.  
Equivalent(s): BCHM 794  
Grade Mode: Letter Grade

BMCB 795 - Investigations in Molecular and Cellular Biology  
Credits: 1-4  
Advanced research or scholarly projects developed and conducted under the supervision of a faculty member. Provides the opportunity to apply advanced knowledge and techniques of the major to a specific problem or question. Permission required.  
Repeat Rule: May be repeated for a maximum of 8 credits.  
Equivalent(s): BCHM 795, BCHM 795W, BMCB 795W  
Grade Mode: Letter Grade

BMCB 795W - Investigations in Molecular and Cellular Biology  
Credits: 1-4  
Advanced research or scholarly projects developed and conducted under the supervision of a faculty member. Provides the opportunity to apply advanced knowledge and techniques of the major to a specific problem or question. Permission required.  
Attributes: Writing Intensive Course  
Repeat Rule: May be repeated for a maximum of 8 credits.  
Equivalent(s): BCHM 795, BCHM 795W, BMCB 795  
Grade Mode: Letter Grade

BMCB 799 - Senior Thesis  
Credits: 1-4  
Independent research project under the direction of a faculty sponsor for seniors in biochemistry, molecular and cellular biology. Final product is a written thesis. One or two semesters. Permission required.  
Attributes: Writing Intensive Course  
Repeat Rule: May be repeated for a maximum of 8 credits.  
Equivalent(s): BCHM 699, BCHM 799, BCHM 799H, BMCB 799H  
Grade Mode: Letter Grade

BMCB 799H - Honors Senior Thesis  
Credits: 1-4  
Independent research project under the direction of a faculty sponsor for seniors in biochemistry, molecular and cellular biology and in the Honors Program. Final product is a written thesis. One or two semesters. Permission required.  
Attributes: Honors course; Writing Intensive Course  
Repeat Rule: May be repeated for a maximum of 8 credits.  
Equivalent(s): BCHM 799, BCHM 799H, BMCB 799  
Grade Mode: Letter Grade