BIOCHEMISTRY - MINOR

A minor is offered in biochemistry. Declaration of a biochemistry minor is open to any student enrolled at CU Boulder, regardless of college or school.

Requirements

A minimum of 21 credits is required for the minor, at least 9 of which must be upper-division. The College of Arts & Sciences will allow a maximum of 9 hours of transfer credit, including 6 upper-division credit hours to count toward a minor. Students may transfer courses through organic chemistry only. All courses required for the minor must be completed with a grade of C- or better, and the overall GPA in all BCHM and CHEM courses taken must be a 2.00.

Students who have taken CHEN 1211/CHEM 1221 may substitute them for CHEM 1113/CHEM 1114.

Code	Title	Credit Hours
General Chemistry		**5-10**
Select one of the following two options:		
Option 1:		
CHEM 1113 & CHEM 1114	General Chemistry 1 and Laboratory in General Chemistry 1	
CHEM 1133 & CHEM 1134	General Chemistry 2 and Laboratory in General Chemistry 2	
Option 2:		
CHEM 1400 & CHEM 1401	Foundations of Chemistry and Foundations of Chemistry Lab	
Organic Chemistry		**10-11**
CHEM 3311	Organic Chemistry 1	
or CHEM 3451	Organic Chemistry 1 for Chemistry and Biochemistry Majors	
CHEM 3321	Laboratory in Organic Chemistry 1	
CHEM 3331	Organic Chemistry 2	
or CHEM 3471	Organic Chemistry 2 for Chemistry Majors	
or BCHM 3491	Organic Chemistry 2 for Biochemistry Majors	
CHEM 3341	Laboratory in Organic Chemistry 2	
or CHEM 3381	Laboratory in Advanced Organic Chemistry	
Biochemistry [1]		**6-8**
Select one of the following:		
BCHM 2700	Foundations of Biochemistry	
or BCHM 4611	Principles of Biochemistry	
Select one of the following:		
BCHM 3400	Mechanisms of Cancer	
BCHM 3450	Principles of Pharmacology and Toxicology	
BCHM 4400	Core Concepts in Physical Chemistry for Biochemists	
BCHM 4631	Computational Genomics Lab	
BCHM 4720	Metabolic Pathways and Human Disease	
BCHM 4740	Biochemistry of Gene Transmission, Expression and Regulation	
BCHM 4850	Therapeutic and Diagnostic Nucleic Acids	
Total Credit Hours		**21-29**

1 Must be completed at CU Boulder.

Learning Outcomes

Upon completing the program, students will be able to:

- Master the foundational concepts of general and organic chemistry, including equilibrium, kinetics, bonding (covalent and non-covalent) and reactivity and apply these concepts to biological systems. \
- Explain how biomolecules (DNA, RNA, proteins, lipids, carbohydrates and metabolites) are synthesized and control biological processes.
- Identify the factors that determine the three-dimensional structures of biological macromolecules (DNA, RNA, proteins), and membranes (including organelles) and explain how structure relates to function.
- Describe how cells sense their environment and use this information to regulate cellular functions such as DNA replication, gene expression, signal transduction, cell division and cell death.
- Develop a conceptual, mechanistic and mathematical understanding of biomolecular interactions, including binding and catalysis.
- Explain how energy is stored, transformed and harnessed in biological systems.
- Analyze data, interpret graphs, solve quantitative problems to interpret results of scientific studies. Evaluate the rigor and reproducibility of scientific results.
- Learn and apply the rigorous scientific methods on which (bio)chemical knowledge is built: making observations, formulating hypotheses, executing experiments, evaluating rigor and reproducibility.
- Effectively communicate scientific information in oral, written and visual formats to specialized and general audiences.