

BIOCHEMISTRY & MOLECULAR BIOLOGY, BACHELOR OF SCIENCE

College of Biological Sciences

The Biochemistry & Molecular Biology major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem solving will find this major a rewarding field of study.

The Program

The upper division curriculum in the Biochemistry & Molecular Biology program begins with the three-course, upper-division common curriculum that introduces the principles of biochemistry and genetics. Majors then take a comprehensive and rigorous laboratory course to familiarize them with the most important aspects of biochemical research. Additional upper-division courses in biochemistry and molecular biology examine detailed aspects of these subjects. Students are also required to take courses in other biological sciences and a full year of physical chemistry.

Career Alternatives

The Biochemistry & Molecular Biology program provides a solid scientific background for students seeking a research, teaching, or service career in the life sciences. Positions are open to biochemists in bio-medical, biotechnological, pharmaceutical, agricultural research, and some chemical industries. Also, university-affiliated research laboratories, hospital laboratories, and government-sponsored research facilities provide employment opportunities. The major provides excellent preparation for advanced study in graduate or professional schools.

Faculty Advisor

Chris Fraser (<https://biology.ucdavis.edu/people/christopher-fraser/>), Ph.D.

Advising

Biology Academic Success Center (BASC), CBS Dean's Office Advising in 1023 Katherine Esau Science Hall; 530-752-0410; Undergraduate Advising (cbsundergrads@ucdavis.edu).

Graduate Study

See Biochemistry, Molecular, Cellular, & Developmental Biology (Graduate Group) (<https://catalog.ucdavis.edu/departments-programs-degrees/biochemistry-molecular-cellular-developmental-biology/>).

The major requirements below are in addition to meeting University Degree Requirements (<https://catalog.ucdavis.edu/undergraduate-education/university-degree-requirements/>) & College Degree Requirements (<https://catalog.ucdavis.edu/undergraduate-education/college-degree-requirements/>); unless otherwise noted. The minimum number of units required for the Biochemistry & Molecular Biology Bachelor of Science is 109.

Code	Title	Units
Preparatory Subject Matter		
<i>Biological Science</i> *		14

BIO 001 & 001L & BIO 002 & BIO 002L & BIO 003	Introductory Biology: Ecology & Evolution and Introductory Biology Lab: Ecology & Evolution and Introductory Biology: Molecules to Cells and Introductory Biology Lab: Molecules to Cells and Introductory Biology: Cells Through Organisms
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Chemistry

Choose 002 or 004 series: ¹ 15

CHE 002A & CHE 002B & CHE 002C	General Chemistry and General Chemistry and General Chemistry
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OR

CHE 004A & CHE 004B & CHE 004C	General Chemistry for the Physical Sciences & Engineering and General Chemistry for the Physical Sciences & Engineering and General Chemistry for the Physical Sciences & Engineering
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Mathematics

Choose the 017 or 021 series: ² 12

MAT 017A & MAT 017B & MAT 017C	Calculus for Biology & Medicine and Calculus for Biology & Medicine and Calculus for Biology & Medicine
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OR

MAT 021A & MAT 021B & MAT 021C	Calculus and Calculus and Calculus
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Physics

Choose the 007 or 009 series: ³ 12-15

PHY 007A & PHY 007B & PHY 007C	General Physics and General Physics and General Physics
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OR

PHY 009A & PHY 009B & PHY 009C	Classical Physics and Classical Physics and Classical Physics
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Preparatory Subject Matter Subtotal 53-56

Depth Subject Matter

Biological Science

BIS 101 or BIS 101V	Genes & Gene Expression	4
BIS 102 or BIS 102V	Structure & Function of Biomolecules	3
BIS 103	Bioenergetics & Metabolism	3
BIS 104	Cell Biology	3

Chemistry

Choose the 118 series or CHE 128 series & 129 A-B: ⁴ 12-13

CHE 118A & CHE 118B & CHE 118C	Organic Chemistry for Health & Life Sciences and Organic Chemistry for Health & Life Sciences and Organic Chemistry for Health & Life Sciences
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OR

CHE 128A & CHE 128B & CHE 128C	Organic Chemistry and Organic Chemistry and Organic Chemistry	
CHE 129A & CHE 129B	Organic Chemistry Laboratory and Organic Chemistry Laboratory	

Choose the 107 or 110 series: 6-12

CHE 107A & CHE 107B	Physical Chemistry for the Life Sciences and Physical Chemistry for the Life Sciences	
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OR

CHE 110A & CHE 110B & CHE 110C	Physical Chemistry: Introduction to Quantum Mechanics and Physical Chemistry: Properties of Atoms & Molecules and Physical Chemistry: Thermodynamics, Equilibria & Kinetics	
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Molecular & Cellular Biology

MCB 120	Molecular Biology & Biochemistry Laboratory Associated Lecture	3
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MCB 120L	Molecular Biology & Biochemistry Laboratory	3
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MCB 121	Advanced Molecular Biology	3
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MCB 123	Behavior & Analysis of Enzyme & Receptor Systems	3
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MCB 124 or MCB 143	Macromolecular Structure & Function Cell & Molecular Biophysics	3-4
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Statistics

Choose STA 100 or 130A & 130B: 4-8

STA 100 or STA 130A & STA 130B	Applied Statistics for Biological Sciences Mathematical Statistics: Brief Course and Mathematical Statistics: Brief Course	
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*Restricted Electives*Choose at least 6 additional units (<https://catalog.ucdavis.edu/departments-programs-degrees/molecular-cellular-biology/biochemistry-molecular-biology-bs/#electives>) 6

Depth Subject Matter Subtotal 56-68

Total Units 109-124

* The BIS 002ABCD series is discontinued; students who have started the BIS 002ABCD series should consult with a BASC advisor to determine which course(s) will complete the lower-division biology requirement.

¹ With BASC advisor approval, these combinations also satisfy the Chemistry requirement: CHE 004A-CHE 002A (3 units with no lab)-CHE 002B-CHE 002C; CHE 004A-CHE 004B-CHE 002C.

² With BASC advisor approval, these combinations also satisfy the Mathematics requirement: MAT 021A-MAT 017B-MAT 017C; MAT 017A-MAT 021B-MAT 021C.

³ With BASC Advisor approval, the following combination also satisfies the Physics requirement: PHY 009A-PHY 009B-PHY 007B-PHY 007C; PHY 009A-PHY 009C-PHY 007A-PHY 007C.

⁴ With BASC advisor approval, these combinations also satisfy the Organic Chemistry requirement: CHE 128A-CHE 118B-CHE 118C; CHE 128A-CHE 128B-CHE 129A-CHE 118C;

CHE 118A-CHE 128B-CHE 128C-CHE 129A-CHE 129B;
CHE 118A-CHE 118B-CHE 128C-CHE 129B.**Restricted Electives**

Code	Title	Units
ANS 137	Techniques & Practices of Avian Culture	3
ANT 151	Primate Evolution	4
ANT 152	Human Evolution	5
ANT 158	The Evolution of Sex: A Biological Perspective	4
BIS, 027A, 027, any upper division 100-199, except 101, 101D, 102, 103, 104, 105 (https://catalog.ucdavis.edu/courses-subject-code/bis/) ⁵		1-5
BIM 162	Introduction to the Biophysics of Molecules & Cells	4
BIT, any upper division 100-199, except tutoring 197T (https://catalog.ucdavis.edu/courses-subject-code/bit/)		1-5
CHE any upper division 100-199, except 107AB, 108, 110ABC, 197T (https://catalog.ucdavis.edu/courses-subject-code/che/)		3-4
EXB 106/CHA 101	Human Gross Anatomy	4
EXB 106L/CHA 101L	Human Gross Anatomy Laboratory	3
ECH 140	Mathematical Methods in Biochemical & Chemical Engineering	4
ECH 142	Heat Transfer for Biochemical & Chemical Engineers	4
ECH 143	Mass Transfer for Biochemical & Chemical Engineers	4
ECH 152A	Chemical Engineering Thermodynamics	3
ECH 152B	Chemical Engineering Thermodynamics	4
ENT 100	General Entomology	4
ENT 102	Insect Physiology	4
ENT 153	Medical Entomology	3
ENT 158	Forensic Entomology	3
EXB 101	Exercise Physiology	4
EXB 117	Exercise & Aging in Health & Disease	3
EXB 124	Physiology of Maximal Human Performance	4
ETX 101	Principles of Environmental Toxicology	4
ETX/NUT 104	Environmental & Nutritional Factors in Cellular Regulation & Nutritional Toxicants	4
ETX 110	Toxic Tragedies & Their Impact on Society	2
ETX 120	Perspectives in Aquatic Toxicology	4
ETX/FST 128	Food Toxicology	3
ETX 130	Role & Applications of Toxicology in Modern Industry	3
EVE, any upper division 100-199, except tutoring 197T (https://catalog.ucdavis.edu/courses-subject-code/eve/)		1-5
FST 100A	Food Chemistry	4
FST 100B	Food Properties	4
FST 102A	Malting & Brewing Science	4
FST 102B	Practical Malting & Brewing	4
FST 104	Food Microbiology	3
FST 123	Introduction to Enzymology	3

FST/ETX 128	Food Toxicology	3
GDB 101	Epidemiology	4
GDB 103	Microbiome of People, Animals, & Plants	3
GEL 107	Earth History: Paleobiology (Discontinued for fall 2026) **	3
IDI 141	Infectious Diseases of Humans	1
MCB/PLB 126	Plant Biochemistry	3
MCB 140L	Cell Biology Laboratory	5
MCB 142	Advanced Cell Biology: Contractile & Motile Systems (Discontinued for winter 2027) **	4
MCB 143	Cell & Molecular Biophysics	3
MCB 144	Mechanisms of Cell Division	3
MCB 145	Assembly & Function of Cell Signaling Machinery	3
MCB 160L	Principles of Genetics Laboratory	5
MCB 162	Human Genetics & Genomics	3
MCB 163	Developmental Genetics	3
MCB 182	Principles of Genomics	3
MIC, any upper division 100-199, except tutoring 197T (https://catalog.ucdavis.edu/courses-subject-code/mic/)		1-5
MMG, any upper division 100-199, except tutoring 197T (https://catalog.ucdavis.edu/courses-subject-code/mmg/)		1-5
MMI 188A or MMI 188B	Human Immunology	3-4
NPB, any upper division 100-199, except 102 & tutoring 197T (https://catalog.ucdavis.edu/courses-subject-code/npb/)		1-5
NUT/ETX 104	Environmental & Nutritional Factors in Cellular Regulation & Nutritional Toxicants	4
NUT 105	Nutrition through the Life Cycle	3
NUT 111AY	Introduction to Nutrition & Metabolism	3
NUT 112	Nutritional Assessment	4
PHY 140B	Introduction to Solid State Physics	4
PLB, any upper division 100-199, except tutoring 197T (https://catalog.ucdavis.edu/courses-subject-code/plb/)		1-5
PLS 147	California Plant Communities	3
PMI, any upper division 100-199, except tutoring 197T (https://catalog.ucdavis.edu/courses-subject-code/pmi/)		1-5
PSC 101	Introduction to Biological Psychology	4
STA 101	Advanced Applied Statistics for the Biological Sciences	4
STA 103	Applied Statistics for Business & Economics	4
STA 104	Applied Statistical Methods: Nonparametric Statistics	4
STA 106	Applied Statistical Methods: Analysis of Variance	4
STA 108	Applied Statistical Methods: Regression Analysis	4
VMB 101V or VMB 101Y	Principles of Pharmacology & Toxicology	3

No more than 3 units of variable-unit courses (numbered 192, 193, or 199) may be used for credit in this category. Note: Although a course might be listed in more than one category, that course may satisfy only one requirement in the entire major.

⁵ BIS 027A & BIS 027B do not meet the College of Biological Sciences upper division unit requirement.

** Course(s) discontinued; see your advisor for course options.

OR

Upper division courses (unless otherwise noted) in biochemistry and molecular biology or other fields relevant to a student's interest chosen in consultation with the Biochemistry and Molecular Biology faculty major advisor and BASC advisor. 3