

MAJOR IN BIOCHEMISTRY, PRE-PHARMACY CONCENTRATION

This concentration augments the ASBMB Concentration with additional coursework in physiology, microbiology, immunology, economics and public speaking. This concentration fulfills the prerequisite courses for admission to most pharmacy schools. It is also an appropriate concentration for a career as a medical technician.

Learning Objectives

Upon successful completion of this program, students will be able to:

1. Explain how DNA is packaged, replicated, repaired, transcribed, and translated in both eukaryotes and prokaryotes.
2. Compare and contrast the regulatory mechanisms of transcription and translation in eukaryotes and prokaryotes.
3. Describe and discuss the molecular architecture of nucleic acids and proteins along with the non-covalent interactions responsible for stabilizing the structure of these macromolecules.
4. Outline the salient features of the central pathways of glycolysis, gluconeogenesis, citric acid cycle, pentose phosphate pathway, fatty acid metabolism, ketogenesis, urea cycle, amino acid and nucleotide metabolism and explain the principles of electron transport, ATP synthesis, and their regulation.

5. Develop an in-depth understanding of cellular functions and their regulation mechanism.
6. Perform a wide-array of biochemical techniques and discuss how these tools are currently being used in biochemical research.
7. Develop the writing, oral, and critical thinking skills necessary to communicate biochemical concepts to other scientist in written and oral form.
8. Identify the major and minor anatomical features within human beings and explain/define their physiological roles.
9. Identify the structural, functional, developmental, and molecular biology aspects of a wide-range of microorganisms emphasizing bacteria.

Requirements Effective Fall 2026

A minimum grade of C (2.000) must be earned for BC 493 and all biochemistry (BC) and LIFE subject code lecture and laboratory courses at or above the 200-level required in the biochemistry major.

If students successfully complete an additional 1-credit course, Responsible Conduct in Biochemical Research BC 360 (<https://catalog.colostate.edu/search/?P=BC%20360>), they can state on their resume that they graduated from an "American Society for Biochemistry and Molecular Biology (ASBMB) accredited program." Further, students also have the option of taking a 1-hour ASBMB exam during the spring semester of their senior year. Student who pass the exam will additionally receive degree certification from ASBMB.

Freshman

		AUCC	Credits
BC 192	Biochemistry Freshman Seminar		2
CHEM 111	General Chemistry I (GT-SC2)	3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)	3A	1
CHEM 113	General Chemistry II		3
CHEM 114	General Chemistry Lab II		1
CO 150	College Composition (GT-CO2)	1A	3
LIFE 102	Attributes of Living Systems (GT-SC1)	3A	4
LIFE 201B	Introductory Genetics: Molecular/Immunological/Developmental (GT-SC2)	3A	3
LIFE 203	Introductory Genetics Laboratory		2
Select one course from the following:			4
MATH 155	Calculus for Biological Scientists I (GT-MA1)	1B	
MATH 160	Calculus for Physical Scientists I (GT-MA1)	1B	
Select one course from the following:			4
MATH 161	Calculus for Physical Scientists II (GT-MA1)	1B	
MATH 255	Calculus for Biological Scientists II	1B	
Total Credits			31

Sophomore

CHEM 341	Modern Organic Chemistry I		3
CHEM 343	Modern Organic Chemistry II		3
CHEM 344	Modern Organic Chemistry Laboratory		2
ECON 202	Principles of Microeconomics (GT-SS1)	3C	3
LIFE 210	Introductory Eukaryotic Cell Biology		3
LIFE 212	Introductory Cell Biology Laboratory		2

SPCM 200	Public Speaking		3
Select one course from the following:			4
BMS 300	Principles of Human Physiology		
BMS 360	Fundamentals of Physiology		
Select one course from the following:			5
PH 121	General Physics I (GT-SC1)	3A	
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	
Total Credits			28
Junior			
BC 401	Comprehensive Biochemistry I	4A	3
BC 403	Comprehensive Biochemistry II	4B	3
BMS 301	Human Gross Anatomy		5
BMS 302	Laboratory in Principles of Physiology		2
MIP 300	General Microbiology		3
MIP 302	General Microbiology Laboratory		2
Select one course from the following:			5
PH 122	General Physics II (GT-SC1)	3A	
PH 142	Physics for Scientists and Engineers II (GT-SC1)	3A	
Select one course from the following:			3
STAT 301	Introduction to Applied Statistical Methods		
STAT 307	Introduction to Biostatistics		
STAT 315	Intro to Theory and Practice of Statistics		
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	3
Advanced Writing (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)		2	3
Total Credits			32
Senior			
BC 404	Comprehensive Biochemistry Laboratory	4B	2
BC 411	Physical Biochemistry		4
BC 493	Senior Seminar	4A,4C	1
Select one course from the following:			3
BC 463	Molecular Genetics		
BC 465	Molecular Regulation of Cell Function		
Select one course from the following:			3
BC 499A	Thesis: Laboratory Research-Based	4C	
BC 499D	Thesis: Literature-based in Pre-Pharmacy	4C	
Foundations and Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#foundations-perspectives) ¹		3B, 3D	9
Electives ²			7
Total Credits			29
Program Total Credits:			120

¹ Select from the list of courses in categories 3B, 3D (six credits [two courses] must come from 3B; one course from category 3D) in the AUCC. Only 3 of the 6 credits required for Arts and Humanities may come from intermediate (L*** 200 and L*** 201) foreign language courses. Students should plan on taking ECON 202 as the AUCC Cat 3C requirement.

² Select enough elective credits to bring the program total to a minimum of 120 credits, of which at least 42 must be upper-division (300- to 400-level).

Major Completion Map

Distinctive Requirements for Degree Program:

TO PREPARE FOR FIRST SEMESTER: The curriculum for the Biochemistry major - Pre-Pharmacy concentration assumes students enter college prepared to begin a year-long calculus sequence (either

MATH 155/MATH 255 or MATH 160/MATH 161 or MATH 160/MATH 255) in the first semester of their first year. Entering students who are not prepared to take calculus should instead take the pre-calculus requirements in the first semester. LIFE 102 requires high school chemistry as a prerequisite; CHEM 111 requires Algebra II as a prerequisite (this prerequisite is met by having Algebra II by test credit,

transfer credit, or placement out of MATH 117 and MATH 118 on Math Placement Exam).

A minimum grade of C (2.000) must be earned for BC 493 and all biochemistry (BC) and LIFE subject code lecture and laboratory courses at or above the 200-level required in the biochemistry major.

Freshman

Semester 1		Critical	Recommended	AUCC	Credits
BC 192	Biochemistry Freshman Seminar				2
CHEM 111	General Chemistry I (GT-SC2)	X		3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)	X		3A	1
LIFE 102	Attributes of Living Systems (GT-SC1)	X		3A	4
Select one course from the following:					4
MATH 155	Calculus for Biological Scientists I (GT-MA1)		X	1B	
MATH 160	Calculus for Physical Scientists I (GT-MA1)		X	1B	

Total Credits **15**

Semester 2		Critical	Recommended	AUCC	Credits
CHEM 113	General Chemistry II	X			3
CHEM 114	General Chemistry Lab II	X			1
CO 150	College Composition (GT-CO2)	X		1A	3
LIFE 201B	Introductory Genetics: Molecular/Immunological/Developmental (GT-SC2)	X		3A	3
LIFE 203	Introductory Genetics Laboratory	X			2
Select one course from the following:					4
MATH 161	Calculus for Physical Scientists II (GT-MA1)		X	1B	
MATH 255	Calculus for Biological Scientists II		X	1B	

Total Credits **16**

Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
CHEM 341	Modern Organic Chemistry I	X			3
ECON 202	Principles of Microeconomics (GT-SS1)			3C	3
LIFE 210	Introductory Eukaryotic Cell Biology	X			3
LIFE 212	Introductory Cell Biology Laboratory	X			2
SPCM 200	Public Speaking				3

Total Credits **14**

Semester 4		Critical	Recommended	AUCC	Credits
CHEM 343	Modern Organic Chemistry II	X			3
CHEM 344	Modern Organic Chemistry Laboratory	X			2
Select one course from the following:					4
BMS 300	Principles of Human Physiology				
BMS 360	Fundamentals of Physiology				
Select one course from the following:					5
PH 121	General Physics I (GT-SC1)		X	3A	
PH 141	Physics for Scientists and Engineers I (GT-SC1)		X	3A	

Total Credits **14**

Junior

Semester 5		Critical	Recommended	AUCC	Credits
BC 401	Comprehensive Biochemistry I	X		4A	3
BMS 302	Laboratory in Principles of Physiology				2
Select one course from the following:					5
PH 122	General Physics II (GT-SC1)		X	3A	

PH 142	Physics for Scientists and Engineers II (GT-SC1)		X	3A	
Select one course from the following:					3
STAT 301	Introduction to Applied Statistical Methods				
STAT 307	Introduction to Biostatistics				
STAT 315	Intro to Theory and Practice of Statistics				
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)				1C	3
Total Credits					16
Semester 6		Critical	Recommended	AUCC	Credits
BC 403	Comprehensive Biochemistry II	X		4B	3
BMS 301	Human Gross Anatomy		X		5
MIP 300	General Microbiology				3
MIP 302	General Microbiology Laboratory				2
Advanced Writing (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)				2	3
PH 122 or PH 142 must be completed by the end of Semester 6.		X			
Total Credits					16
Senior					
Semester 7		Critical	Recommended	AUCC	Credits
BC 404	Comprehensive Biochemistry Laboratory		X	4B	2
BC 411	Physical Biochemistry	X			4
BC 493	Senior Seminar	X		4A,4C	1
Select one course from the following:					3
BC 463	Molecular Genetics	X			
Foundations and Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#foundations-perspectives)				3B, 3D	
Electives					4
Students that elect to take BC 463 must do so Fall (Semester 7) and plan to take AUCC 3B, 3D (Foundations and Perspectives) in Spring (Semester 8).					
Total Credits					14
Semester 8		Critical	Recommended	AUCC	Credits
Select one course from the following:		X			3
BC 465	Molecular Regulation of Cell Function	X			
Foundations and Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#foundations-perspectives)		X		3B, 3D	
Select one course from the following:					3
BC 499A	Thesis: Laboratory Research-Based	X		4C	
BC 499D	Thesis: Literature-based in Pre-Pharmacy	X		4C	
Foundations and Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#foundations-perspectives)		X		3B, 3D	6
Elective		X			3
Students that elect to take BC 465 must do so Spring (Semester 8) and plan to take AUCC 3B, 3D (Foundations and Perspectives) in Fall (Semester 7).		X			
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.		X			
Total Credits					15
Program Total Credits:					120