

# BIOCHEMISTRY, MOLECULAR AND CELLULAR BIOLOGY MAJOR (B.S.)

<https://colsa.unh.edu/molecular-cellular-biomedical-sciences/program/bs/biochemistry-molecular-cellular-biology-major>

## Description

The Biochemistry, Molecular & Cellular Biology (BMCB) major provides you with conceptual competence and practical laboratory and analytical skills to understand the molecular and cellular foundations of life. Your BMCB degree will prepare you for immediate employment as a research technician or for entry into graduate school or into professional programs in medicine, dentistry or other allied health professions.

### The BMCB program offers advanced coursework and laboratories in diverse topics

- Cancer biology
- Cell & developmental biology
- Cell culture & tissue engineering
- Endocrinology
- Molecular biology techniques
- Pharmacology
- Physical biochemistry
- Protein structure, function & proteomics

### BMCB majors participate in experiential learning activities

- Many courses have integrated laboratory experiences to foster inquiry-based learning and to train creative and critical thinkers
- Independent research experiences in faculty research laboratories provide exposure to cutting-edge techniques and instrumentation
- Job preparation can be enhanced by internships with regional biotechnology and pharmaceutical companies
- Summer undergraduate research fellowships at U.S. or international academic institutions combine travel with research opportunities outside UNH

### BMCB graduates have been successful in many careers

- Research technicians and laboratory technicians
  - Biotechnology and pharmaceutical companies
  - Government agencies
  - Forensics laboratories
  - Academic research laboratories
  - Hospitals
- Science journalists and technical writers
- Healthcare
- Scientific supply companies
- Sales and marketing
- Regulatory agencies
- Primary and secondary school educators (with additional coursework in education)

### BMCB graduates are well prepared for post-baccalaureate education in

- M.S. and doctoral programs in a large variety of disciplines
- Professional health programs
  - Medical
  - Dental
  - Pharmacy
  - Physician's Assistant and other allied health programs

*Note:* The BMCB major is designed so you can complete in four years all of the prerequisite courses needed to seek admission to graduate schools or health professional schools.

## Requirements

Students in the Biochemistry, Molecular and Cellular Biology (BMCB) major take eight Foundation courses, four Bioscience Core courses, five BMCB Core courses, and three Major Elective courses. One capstone experience, supervised and approved within the major, is required of all seniors. In addition, all other University academic requirements must be completed, including those for the Discovery Program (<https://catalog.unh.edu/undergraduate/university-academic-requirements/discovery-program>) and the University Writing Requirement. (<http://www.unh.edu/undergrad-catalog/gi.cfm?thisid=28&masterid=27&headingid=27/#28>)

A grade of C-minus or better is required in Statistics and all Bioscience Core, BMCB Core, and Major Elective courses.

### Foundation Core Courses

Code	Title	Credits
CHEM 403	General Chemistry I <sup>1</sup>	4
CHEM 404	General Chemistry II	4
CHEM 547 & CHEM 549	Organic Chemistry I and Organic Chemistry Laboratory	5
CHEM 548 & CHEM 550	Organic Chemistry II and Organic Chemistry Laboratory	5
MATH 424B	Calculus for Life Sciences <sup>2,3</sup>	4
BIOL 528	Applied Biostatistics I <sup>3</sup>	4
PHYS 401	Introduction to Physics I <sup>4</sup>	4
PHYS 402	Introduction to Physics II <sup>4</sup>	4

<sup>1</sup> Fulfills the Physical Science Discovery requirement

<sup>2</sup> Fulfills Quantitative Reasoning Discovery requirement

<sup>3</sup> MATH 425 and MATH 426 can be substituted for MATH 424B and BIOL 528

<sup>4</sup> PHYS 407 and PHYS 408 can be substituted for PHYS 401 and PHYS 402

### Bioscience Core Courses

Code	Title	Credits
BIOL 411	Introductory Biology: Molecular and Cellular <sup>5</sup>	4
BIOL 412	Introductory Biology: Evolution, Biodiversity and Ecology	4

BMS 503 & BMS 504	General Microbiology and General Microbiology Laboratory	5
GEN 604	Principles of Genetics	4

<sup>5</sup> BIOL 411 fulfills the Biological Science Discovery requirement, Discovery Laboratory requirement, and the Discovery Inquiry requirement

#### **BMCB Core Courses**

Code	Title	Credits
BMCB 401	Professional Perspectives in Biochemistry, Molecular and Cellular Biology	1
BMCB 605	Eukaryotic Cell and Developmental Biology	4
BMCB 751	Principles of Biochemistry	4
BMCB 752	Principles of Biochemistry	4
GEN 704 or GEN 771	Genetics of Prokaryotic Microbes Molecular Genetics	4-5

#### **BMCB Major Electives**

A total of three **unique** major electives is required: one Laboratory Techniques course and two Major Elective courses.

#### **Laboratory Techniques Courses (Pick one)**

Code	Title	Credits
BMCB 753	Cell Culture	5
BMCB 754	Molecular Biology Research Methods	5
BMCB 755	Laboratory in Biochemistry and Molecular Biology	5

#### **Bioscience Major Electives (Pick two)**

Code	Title	Credits
BMCB 750	Physical Biochemistry	3
BMCB 753	Cell Culture <sup>6</sup>	5
BMCB 754	Molecular Biology Research Methods <sup>6</sup>	5
BMCB 755	Laboratory in Biochemistry and Molecular Biology <sup>6</sup>	5
BMCB 760	Pharmacology	4
BMCB 763	Biochemistry of Cancer	4
BMCB #783	Proteomics for Biological Discoveries	4
BMCB 794	Protein Structure and Function	4
ANSC 701	Physiology of Reproduction	4
ANSC 715	Physiology of Lactation	4
BMS 702	Endocrinology	4
BMS 704	Pathologic Basis of Disease	4
BMS 705 & BMS 715	Immunology and Immunology Laboratory	5
BMS 706 & BMS 708	Virology and Virology Laboratory	5
BMS 718	Mammalian Physiology	4
CHEM 755	Advanced Organic Chemistry	3
GEN 704	Genetics of Prokaryotic Microbes <sup>6</sup>	5
GEN 706	Human Genetics	4
GEN 711	Genomics and Bioinformatics	4
GEN 713	Microbial Ecology and Evolution	4
GEN 715	Molecular Evolution	4

GEN 717	Molecular Microbiology	5
GEN 771	Molecular Genetics <sup>6</sup>	4
NUTR 750	Nutritional Biochemistry	4
PSYC 731	Brain and Behavior	4
ZOOL 777	Neuroethology	3

<sup>6</sup> If course was used to fulfill BMCB Core or Laboratory Technique requirement, course cannot count as Bioscience Major Elective.

#### **Approved BMCB Capstone Courses**

The capstone explores areas of interest based on the integration of prior learning. The capstone requirement may be satisfied through a course, created work or product, or some form of experiential learning (e.g., honors thesis, mentored research project, or other special student activity).

Code	Title	Credits
BMCB 750	Physical Biochemistry	3
BMCB 760	Pharmacology	4
BMCB 763	Biochemistry of Cancer	4
BMCB #783	Proteomics for Biological Discoveries	4
BMCB 794	Protein Structure and Function	4
BMCB 795	Investigations in Molecular and Cellular Biology (4-1-4 credit minimum)	4-1-4
BMCB 795W	Investigations in Molecular and Cellular Biology (4-1-4 credit minimum)	4-1-4
BMCB 799	Senior Thesis (4-credit minimum)	1-4
BMS 799H	Senior Honors Thesis (4-credit minimum)	1-4
INCO 790	Advanced Research Experience (4-credit minimum)	1-4

For a Capstone experience not listed above, such as an internship, submit a Capstone Approval form **prior** to beginning the experience.

## Degree Plan

### **SAMPLE Course Sequence for Biochemistry, Molecular, and Cellular Biology**

Course	Title	Credits
<b>First Year</b>		
<b>Fall</b>		
BMCB 401	Professional Perspectives in Biochemistry, Molecular and Cellular Biology	1
ENGL 401	First-Year Writing	4
CHEM 403	General Chemistry I	4
BIOL 411	Introductory Biology: Molecular and Cellular Discovery Course	4
		Credits
		17
<b>Spring</b>		
CHEM 404	General Chemistry II	4
BIOL 412	Introductory Biology: Evolution, Biodiversity and Ecology	4
MATH 424B	Calculus for Life Sciences	4
Discovery Course		4
		Credits
		16

**Second Year****Fall**

CHEM 547 & CHEM 549	Organic Chemistry I and Organic Chemistry Laboratory	5
BMS 503 & BMS 504	General Microbiology and General Microbiology Laboratory	5
BIOL 528	Applied Biostatistics I	4
PHYS 401	Introduction to Physics I	4
	Credits	18

**Spring**

CHEM 548 & CHEM 550	Organic Chemistry II and Organic Chemistry Laboratory	5
GEN 604	Principles of Genetics	4
PHYS 402	Introduction to Physics II	4
Discovery Course		4
	Credits	17

**Third Year****Fall**

BMCB 751	Principles of Biochemistry	4
BMCB Core or Lab Techniques course		4-5
Discovery Course		4
Elective (any course)		4
	Credits	16-17

**Spring**

BMCB 605	Eukaryotic Cell and Developmental Biology	4
BMCB 752	Principles of Biochemistry	4
BMCB Core or Lab Techniques course		4-5
Discovery Course		4
	Credits	16-17

**Fourth Year****Fall**

Major Elective (possible Capstone)		4
Discovery Course		4
Elective (any course)		4
Elective (any course)		4
	Credits	16

**Spring**

Elective (any course)		4-5
Major Elective		4
Elective (any course)		4
	Credits	12-13
	Total Credits	128-131