

# BIOCHEMISTRY, CHEMISTRY (BS)

Degree: Bachelor of Science  
Major: Chemistry  
Concentration: Biochemistry  
Program Code: 3476

## About This Major . . .

Biochemistry students build a strong foundation in chemistry and apply their knowledge to problems in chemistry and biology. Students learn to critically analyze chemical structures and chemical and biochemical reactions, skills which are necessary for success in fields of biochemistry, medicinal chemistry, medicine, pharmacy and chemical biology. By taking upper division courses in chemistry and biology, biochemistry majors develop a strong understanding of both subjects. Through research under a chemistry or biology faculty member, students can enhance their laboratory and critical thinking skills.

The program culminates in two courses designed to bridge students' coursework with their entry into the workforce, a medical degree program, or graduate school. The Advanced Laboratory course helps students to synthesize knowledge from various chemical disciplines and apply it to solving chemical problems in a practical manner. This is similar to the type of process that they are likely to experience after graduation. Our Communicating in the World of Chemistry course couples with our Advanced Laboratory course to help students express themselves in a professional manner while applying for and entering their new positions.

Colorado Mesa University graduates have been successful in finding jobs in the pharmaceutical industry and in secondary education, as well as being placed in graduate, pharmacy and medical schools.

For more information on what you can do with this major, visit Career Services' What to Do with a Major? (<https://www.coloradomesa.edu/career/students/explore/major.html>) resource.

All CMU baccalaureate graduates are expected to demonstrate proficiency in specialized knowledge/applied learning, quantitative fluency, communication fluency, critical thinking, personal and social responsibility, and information literacy. In addition to these campus-wide student learning outcomes, graduates of this major will be able to:

1. Demonstrate fluency in the concepts from major fields of chemistry (organic, physical, analytical, and biochemistry...)
2. Utilize mathematics to solve chemical and biological problems.
3. Employ proper experimental techniques.
4. Interpret chemical and biological information from peer-reviewed publications.
5. Communicate chemical and biological topics effectively, both verbally and in writing.
6. Demonstrate a solid understanding of genetics, cellular, and molecular biology.

## Requirements

Each section below contains details about the requirements for this program. Select a header to expand the information/requirements for that particular section of the program's requirements.

To print or save an overview of this program's information, including the program description, learning outcomes, requirements, suggested course sequencing (if applicable), and advising and graduation information, scroll to the bottom of the left-hand navigation menu and select 'Print Options.' This will give you the options to either 'Send Page to Printer' or 'Download PDF of This Page.' The 'Download PDF of This Page' option prepares a much more concise presentation of all program information. The PDF is also printable and may be preferable due to its brevity.

## Institutional Degree Requirements

The following institutional degree requirements apply to all CMU baccalaureate degrees. Specific programs may have different requirements that must be met in addition to institutional requirements.

- 120 semester hours minimum.
- Students must complete a minimum of 30 of the last 60 hours of credit at CMU, with at least 15 semester hours in major discipline courses numbered 300 or higher.
- 40 upper-division credits (an alternative credit limit applies to the Bachelor of Applied Science degree).
- 2.00 cumulative GPA or higher in all CMU coursework.
- A course may only be used to fulfill one requirement for each degree/certificate.
- No more than six semester hours of independent study courses can be used toward the degree.
- Non-traditional credit, such as advanced placement, credit by examination, credit for prior learning, cooperative education and internships, cannot exceed 30 semester credit hours for a baccalaureate degree. A maximum of 15 of the 30 credits may be for cooperative education, internships, and practica.
- Pre-collegiate courses (usually numbered below 100) cannot be used for graduation.
- Capstone exit assessment/projects (e.g., Major Field Achievement Test) requirements are identified under Program-Specific Degree Requirements.
- The Catalog Year determines which program sheet and degree requirements a student must fulfill in order to graduate. Visit with your advisor or academic department to determine which catalog year and program requirements you should follow.
- See "Requirements for Undergraduate Degrees and Certificates" in the catalog for a complete list of graduation requirements.

## Essential Learning Requirements

(31 semester hours)

See the current catalog for a list of courses that fulfill the requirements below. If a course is an Essential Learning option and a requirement for your major, you must use it to fulfill the major requirement and make a different selection for the Essential Learning requirement.

Code	Title	Semester Credit Hours
<b>English</b> <sup>1</sup>		
ENGL 111	English Composition I-GTCO1	3
ENGL 112	English Composition II-GTCO2	3
<b>Mathematics</b> <sup>1</sup>		
MATH 151	Calculus I-GT-MA1 <sup>2</sup>	3

<b>History</b>	
Select one History course	3
<b>Humanities</b>	
Select one Humanities course	3
<b>Social and Behavioral Sciences</b>	
Select one Social and Behavioral Sciences course	3
Select one Social and Behavioral Sciences course	3
<b>Fine Arts</b>	
Select one Fine Arts course	3
<b>Natural Sciences</b>	
Select one Natural Sciences course with a lab	4
Select one Natural Sciences course	3
<b>Total Semester Credit Hours</b>	<b>31</b>

<sup>1</sup> Must receive a grade of 'C' or better and must be complete by the time the student has 60 semester hours.

<sup>2</sup> This is a 5 credit course. 3 credits apply to the Essential Learning requirements and 2 credits apply to electives.

## Other Lower Division Requirements

Code	Title	Semester Credit Hours
<b>Wellness Requirement</b>		
KINE 100	Health and Wellness	1
Select one Activity course		1
<b>Essential Learning Capstone</b> <sup>1</sup>		
ESSL 290	Maverick Milestone	3
ESSL 200	Essential Speech	1
<b>Total Semester Credit Hours</b>		<b>6</b>

<sup>1</sup> Essential Learning Capstone must be taken after completion of the Essential Learning English and Mathematics requirements, and when a student has earned between 45 and 75 hours.

## Foundation Courses

(21 semester hours, must earn a grade of "C" or better in each course)

Code	Title	Semester Credit Hours
BIOL 105	Attributes of Living Systems-GTSC1	3
BIOL 105L	Attributes of Living Systems Laboratory-GTSC1	1
MATH 151	Calculus I-GT-MA1	2
MATH 152	Calculus II	5
Select one of the following sets of courses:		5
PHYS 131 & 131L	Fundamental Mechanics-GTSC1 and Fundamental Mechanics Laboratory-GTSC1	
PHYS 111 & 111L	General Physics-GTSC1 and General Physics Laboratory-GTSC1	
Select one of the following sets of courses:		5
PHYS 132 & 132L	Electromagnetism and Optics-GTSC1 and Electromagnetism and Optics Laboratory-GTSC1	

PHYS 112 & 112L	General Physics-GTSC1 and General Physics Laboratory-GTSC1	
<b>Total Semester Credit Hours</b>		<b>21</b>

## Program Specific Degree Requirements

(54 semester hours, must pass all courses with a grade of "C" or higher)

Code	Title	Semester Credit Hours
<b>Core Courses</b>		
CHEM 131	General Chemistry I-GTSC1	4
CHEM 131L	General Chemistry Laboratory I-GTSC1	1
CHEM 132	General Chemistry II-GTSC1	4
CHEM 132L	General Chemistry Laboratory II-GTSC1	1
CHEM 301	Analytical Chemistry	3
CHEM 301L	Analytical Chemistry Laboratory	1
CHEM 311	Organic Chemistry I	4
CHEM 311L	Organic Chemistry I Laboratory	1
CHEM 312	Organic Chemistry II	4
CHEM 312L	Organic Chemistry II Laboratory	1
CHEM 341	Advanced Laboratory I	2
CHEM 442	Communicating in the World of Chemistry	1
<i>Biochemistry Concentration Courses</i>		
CHEM 315	Biochemistry	3
CHEM 315L	Biochemistry Laboratory	1
CHEM 316	Biochemistry II	3
CHEM 321	Physical Chemistry I	3
BIOL 301	Principles of Genetics	3
BIOL 301L	Principles of Genetics Laboratory	1
BIOL 302	Cellular Biology	3
BIOL 371L	Laboratory Investigations in Cellular and Molecular Biology	3
<b>Total Semester Credit Hours</b>		<b>47</b>

Code	Title	Semester Credit Hours
<b>Restricted Electives</b>		
Select 7 semester hours from the following list: <sup>1</sup>		7
CHEM 322	Physical Chemistry II	
CHEM 351	Inorganic Chemistry I	
CHEM 352	Inorganic Chemistry II	
CHEM 396	Topics	
CHEM 397	Structured Research	
CHEM 421	Advanced Organic Chemistry I	
CHEM 422	Advanced Organic Chemistry II	
CHEM 431 & 431L	Instrumental Analysis and Instrumental Analysis Laboratory	
CHEM 487	Formal Research	
CHEM 494	Seminar	
CHEM 496	Topics	
CHEM 497	Structured Research	

BIOL 310 & 310L	Developmental Biology and Developmental Biology Laboratory	
BIOL 341 & 341L	General Physiology and General Physiology Laboratory	
BIOL 343	Immunology	
BIOL 350 & 350L	Microbiology and Microbiology Laboratory	
BIOL 387	Structured Research	
BIOL 403	Evolution	
BIOL 425	Molecular Genetics	
BIOL 441	Endocrinology	
BIOL 442	Pharmacology	
BIOL 487	Advanced Research	
Total Semester Credit Hours		7

<sup>1</sup> No more than 4 semester hours can come from CHEM 397, CHEM 487, CHEM 497, BIOL 387, or BIOL 487

## General Electives

All college level courses appearing on your final transcript, not listed above that will bring your total semester hours to 120 hours. 8 semester hours.

Code	Title	Semester Credit Hours
MATH 151	Calculus I-GT-MA1	2
Select electives		6
Total Semester Credit Hours		8

<sup>1</sup> This is a 5 credit course. 3 credits apply to the Essential Learning requirements and 2 credits apply to electives.

## Suggested Course Plan

### First Year

Fall Semester		Semester Credit Hours
CHEM 131 & 131L	General Chemistry I-GTSC1 and General Chemistry Laboratory I-GTSC1	5
Essential Learning - History		3
ENGL 111	English Composition I-GTCO1	3
Essential Learning - Natural Science with Lab		4
Semester Credit Hours		15
Spring Semester		Semester Credit Hours
CHEM 132 & 132L	General Chemistry II-GTSC1 and General Chemistry Laboratory II-GTSC1	5
ENGL 112	English Composition II-GTCO2	3
BIOL 105 & 105L	Attributes of Living Systems-GTSC1 and Attributes of Living Systems Laboratory-GTSC1	4
Essential Learning - Social and Behavioral Sciences		3
Semester Credit Hours		15

### Second Year

Fall Semester		Semester Credit Hours
MATH 151	Calculus I-GT-MA1	5
CHEM 311 & 311L	Organic Chemistry I and Organic Chemistry I Laboratory	5
Select one of the following:		5

PHYS 131 & 131L	Fundamental Mechanics-GTSC1 and Fundamental Mechanics Laboratory-GTSC1	
PHYS 111 & 111L	General Physics-GTSC1 and General Physics Laboratory-GTSC1	
Semester Credit Hours		15

### Spring Semester

MATH 152	Calculus II	5
CHEM 312 & 312L	Organic Chemistry II and Organic Chemistry II Laboratory	5
Select one of the following:		5
PHYS 132 & 132L	Electromagnetism and Optics-GTSC1 and Electromagnetism and Optics Laboratory-GTSC1	
PHYS 112 & 112L	General Physics-GTSC1 and General Physics Laboratory-GTSC1	
Semester Credit Hours		15

### Third Year

#### Fall Semester

CHEM 315 & 315L	Biochemistry and Biochemistry Laboratory	4
BIOL 302	Cellular Biology	3
Essential Learning - Natural Science		3
ESSL 290	Maverick Milestone	3
ESSL 200	Essential Speech	1
Semester Credit Hours		14

#### Spring Semester

CHEM 316	Biochemistry II	3
CHEM 301 & 301L	Analytical Chemistry and Analytical Chemistry Laboratory	4
BIOL 301 & 301L	Principles of Genetics and Principles of Genetics Laboratory	4
KINE 100	Health and Wellness	1
KINA Activity		1
General Elective		2
Semester Credit Hours		15

### Fourth Year

#### Fall Semester

CHEM 321	Physical Chemistry I	3
BIOL 371L	Laboratory Investigations in Cellular and Molecular Biology	3
Restricted Electives		4
Essential Learning - Fine Arts		3
Essential Learning - Social and Behavioral Sciences		3
Semester Credit Hours		16

#### Spring Semester

CHEM 341	Advanced Laboratory I	2
CHEM 442	Communicating in the World of Chemistry	1
Essential Learning - Humanities		3
Restricted Elective		3
General Electives (2 courses)		6
Semester Credit Hours		15
Total Semester Credit Hours		120

## Advising and Graduation Advising Process and DegreeWorks

Documentation on the pages related to this program is intended for informational purposes to help determine what courses and associated requirements are needed to earn a degree. The suggested course sequencing outlines how students could finish degree requirements. Some courses are critical to complete in specific semesters, while others may be moved around. Meeting with an academic advisor is essential in planning courses and altering the suggested course sequencing. It

is ultimately the student's responsibility to understand and fulfill the requirements for her/his intended degree(s).

DegreeWorks is an online degree audit tool available in MAVzone. It is the official record used by the Registrar's Office to evaluate progress towards a degree and determine eligibility for graduation. Students are responsible for reviewing their DegreeWorks audit on a regular basis and should discuss questions or concerns with their advisor or academic department head. Discrepancies in requirements should be reported to the Registrar's Office.

## Graduation Process

Students must complete the following in the first two months of the semester prior to completing their degree requirements:

- Review their DegreeWorks audit and create a plan that outlines how unmet requirements will be met in the final semester.
- Meet with their advisor and modify their plan as needed. The advisor must approve the final plan.
- Submit the "Intent to Graduate" form to the Registrar's Office to officially declare the intended graduation date and commencement ceremony plans.
- Register for all needed courses and complete all requirements for each degree sought.

Submission deadlines and commencement details can be found at <http://www.coloradomesa.edu/registrar/graduation.html>.

If a student's petition for graduation is denied, it will be her/his responsibility to consult the Registrar's Office regarding next steps.