



## 2017-2018 PROGRAM REQUIREMENTS

Degree: Bachelor of Science

Major: Chemistry

Concentration: Biochemistry

### 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, go to <http://www.coloradomesa.edu/career/whatmajor.html>

All CMU baccalaureate graduates are expected to demonstrate proficiency in critical thinking, communication fluency, quantitative fluency, and specialized knowledge/applied learning. 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.

### Advising Process and DegreeWorks

This document 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.

### **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.

### **PROGRAM-SPECIFIC DEGREE REQUIREMENTS**

- A "C" or higher is required in all major and foundation courses.

### **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.

**English** (6 semester hours, must receive a grade of "C" or better and must be completed by the time the student has 60 semester hours.)

- ENGL 111 - English Composition (3)
- ENGL 112 - English Composition (3)

**Mathematics** (3 semester hours, must receive a grade of "C" or better, must be completed by the time the student has 60 semester hours.)

- MATH 151 - Calculus I (5)  
3 credits apply to the Essential Learning requirements and 2 credits apply to foundation courses.

**Humanities** (3 semester hours)

- Select one Humanities course (3)

**Social and Behavioral Sciences** (6 semester hours)

- Select one Social and Behavioral Sciences course (3)
- Select one Social and Behavioral Sciences course (3)

**Natural Sciences** (7 semester hours, one course must include a lab)

- Select one Natural Sciences course (3)
- Select one Natural Sciences course with a lab (4)

**History** (3 semester hours)

- Select one History course (3)

**Fine Arts** (3 semester hours)

- Select one Fine Arts course (3)

### **OTHER LOWER-DIVISION REQUIREMENTS**

**Wellness Requirement** (2 semester hours)

- KINE 100 - Health and Wellness (1)
- Select one Activity course (1)

**Essential Learning Capstone** (4 semester hours)

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.

- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)

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

- BIOL 105 - Attributes of Living Systems (3)
- BIOL 105L - Attributes of Living Systems Laboratory (1)
- MATH 151 - Calculus I (2)
- MATH 152 - Calculus II (5)
- One of the following sets of courses:
  - PHYS 131 - Fundamental Mechanics (4) with PHYS 131L - Fundamental Mechanics Laboratory (1)
  - PHYS 111 - General Physics (4) with PHYS 111L - General Physics Laboratory (1)
- One of the following sets of courses:
  - PHYS 132 - Electromagnetism and Optics (4) with PHYS 132L - Electromagnetism and Optics Laboratory (1)
  - PHYS 112 - General Physics (4) with PHYS 112L - General Physics Laboratory (1)

**BS, CHEMISTRY, BIOCHEMISTRY REQUIREMENTS** (54 semester hours, must pass all courses with a grade of "C" or higher)

**Core Courses** (27 semester hours)

- CHEM 131 - General Chemistry I (4)
- CHEM 131L - General Chemistry I Laboratory (1)
- CHEM 132 - General Chemistry II (4)
- CHEM 132L - General Chemistry II Laboratory (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)

**Biochemistry Concentration Courses** (20 semester hours)

- 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)

**Restricted Electives** (7 semester hours)

Select 7 semester hours from the following list: (no more than 4 semester hours can come from CHEM 397, CHEM 487, CHEM 497, BIO 387, or BIOL 487)

- CHEM 322 - Physical Chemistry II (3)
- CHEM 351 - Inorganic Chemistry I (3)
- CHEM 352 - Inorganic Chemistry II (3)
- CHEM 396 - Topics (1-3)
- CHEM 397 - Structured Research (1-3)
- CHEM 421 - Advanced Organic Chemistry I (3)
- CHEM 422 - Advanced Organic Chemistry II (3)
- CHEM 431 - Instrumental Analysis (3) with CHEM 431L - Instrumental Analysis Laboratory (1)
- CHEM 487 - Formal Research (1-3)
- CHEM 494 - Seminar (1)
- CHEM 496 - Topics (3)
- CHEM 497 - Structured Research (1-3)
- BIOL 310 - Developmental Biology (3) with BIOL 310L - Developmental Biology Laboratory (2)
- BIOL 341 - General Physiology (3) with BIOL 341L - General Physiology Laboratory (1)
- BIOL 343 - Immunology (3)
- BIOL 350 - Microbiology (3) with BIOL 350L - Microbiology Laboratory (1)
- BIOL 387 - Structured Research (1-3)
- BIOL 403 - Evolution (3)
- BIOL 425 - Molecular Genetics (3)
- BIOL 441 - Endocrinology (3)
- BIOL 442 - Pharmacology (3)
- BIOL 487 - Advanced Research (1-3)

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**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)

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## SUGGESTED COURSE SEQUENCING

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### Freshman Year, Fall Semester: 15 credits

- CHEM 131 - General Chemistry I (4) and CHEM 131L - General Chemistry I Laboratory (1)
- Essential Learning - History (3)
- ENGL 111 - English Composition (3)
- Essential Learning - Natural Science with Lab (4)

### Freshman Year, Spring Semester: 15 credits

- CHEM 132 - General Chemistry II (4) and CHEM 132L - General Chemistry II Laboratory (1)
  - ENGL 112 - English Composition (3)
  - BIOL 105 - Attributes of Living Systems (3) and BIOL 105L - Attributes of Living Systems Laboratory (1)
  - Essential Learning - Social and Behavioral Sciences (3)
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### Sophomore Year, Fall Semester: 15 credits

- MATH 151 - Calculus I (5)
- CHEM 311 - Organic Chemistry I (4) and CHEM 311L - Organic Chemistry I Laboratory (1)
- PHYS 131/PHYS 131L - Fundamental Mechanics with Lab (5) or PHYS 111/PHYS 111L - General Physics with Lab (5)

### Sophomore Year, Spring Semester: 15 credits

- MATH 152 - Calculus II (5)
  - CHEM 312 - Organic Chemistry II (4) and CHEM 312L - Organic Chemistry II Laboratory (1)
  - PHYS 132/PHYS 132L - Electromagnetism and Optics with Lab (5) or PHYS 112/PHYS 112L - General Physics with Lab (5)
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### Junior Year, Fall Semester: 14 credits

- CHEM 315 - Biochemistry (3) and CHEM 315L - Biochemistry Laboratory (1)
- BIOL 302 - Cellular Biology (3)
- Essential Learning - Natural Science (3)
- ESSL 290 - Maverick Milestone (3)
- ESSL 200 - Essential Speech (1)

### Junior Year, Spring Semester: 15 credits

- CHEM 316 - Biochemistry II (3)
  - CHEM 301 - Analytical Chemistry (3) and CHEM 301L - Analytical Chemistry Laboratory (1)
  - BIOL 301 - Principles of Genetics (3) and BIOL 301L - Principles of Genetics Laboratory (1)
  - KINE 100 - Health and Wellness (1)
  - KINA Activity (1)
  - General Elective (2)
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### Senior Year, Fall Semester: 16 credits

- 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)

### Senior Year, Spring Semester: 15 credits

- 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)
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