CELLULAR, MOLECULAR, AND DEVELOPMENTAL BIOLOGY, BIOLOGICAL SCIENCES (BS)

Degree: Bachelor of Science
Major: Biological Sciences
Concentration: Cellular, Molecular, and Developmental Biology
Program Code: 3414

About This Major . . .

The Bachelor of Science degree with a Biological Sciences major provides a broad background in the biological sciences. Students choose biology courses from four categories: cellular, molecular, and developmental biology; anatomical and physiological biology; organismal biology; and ecology, evolution, and systematics. The Cellular, Molecular, and Developmental Biology Concentration will provide a solid background in cell and molecular biology, genetics, and biochemistry. The concentration prepares graduates of this program for careers in the medical field, cell biology, and biotechnology, which are just a few of the career options available.

For more information on what you can do with this major, visit Career Services' What to Do with a Major? 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:

a. Demonstrate a broad, comprehensive knowledge of the main areas of biology (including evolution, diversity, ecology, cell biology, and genetics) and the ability to apply this knowledge to address new questions. (Specialized knowledge)
b. Collect and analyze quantitative data and interpret quantitative data presented in primary scientific literature. (Quantitative Fluency/ Applied Learning)
c. Utilize science as a way of thinking and problem solving and make key observations, ask questions, formulate hypotheses, design experiments, collect data, draw logical conclusions, and explain and defend those conclusions to others. (Critical Thinking)
d. Demonstrate effective biological communication skills, both in writing and orally. (Communication fluency)
e. Evaluate and defend contrasting viewpoints related to ethical, social, civic, and/or environmental challenges in the field of biological sciences. Personal Social Responsibility)
f. Critically search, evaluate, and appropriately apply information from primary scientific literature.(Information Literacy)

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
English [1]		
ENGL 111	English Composition I-GTCO1	3
ENGL 112	English Composition II-GTCO2	3
Mathematics [1]		
MATH 151	Calculus I-GT-MA1 [2]	3
History		
Select one History course		3
Humanities		
Select one Humanities course		3

Social and Behavioral Sciences		
Select one Social and Behavioral Sciences course		3
Select one Social and Behavioral Sciences course		3
Fine Arts		
Select one Fine Arts course		3
Natural Sciences [3]		
CHEM 131 & 131L	General Chemistry I-GTSC1 and General Chemistry Laboratory I-GTSC1	4
CHEM 132 & 132L	General Chemistry II-GTSC1 and General Chemistry Laboratory II-GTSC1	3
Total Semester Credit Hours		**31**

[1] Must receive a grade of "C" or better and must be complete by the time the student has 60 semester hours.

[2] This is a 5 credit course. 3 credits apply to the Essential Learning requirements and 2 credits apply to electives. A lower level Math course may be necessary before registering for MATH 151. An ALEKS Math Placement test will determine the appropriate Math course.

[3] CHEM 131/CHEM 131L and CHEM 132/CHEM 132L are 5 credit hours each for a total of 10 semester hours. 7 credits apply to the Essential Learning Natural Science requirement and 3 credits apply to electives.

Other Lower Division Requirements

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

Foundation Courses

(17-19 semester hours, must pass each courses with a grade of "C" or higher. Foundation courses should be completed by the end of the sophomore year.)

Code	Title	Semester Credit Hours
BIOL 105 & 105L	Attributes of Living Systems-GTSC1 and Attributes of Living Systems Laboratory-GTSC1	4
PHYS 111 & 111L	General Physics I-GTSC1 and General Physics I Laboratory-GTSC1 [1]	5
PHYS 112 & 112L	General Physics II-GTSC1 and General Physics II Laboratory-GTSC1 [1]	5
STAT 200 or MATH 152	Probability and Statistics-GTMA1 Calculus II	3-5
Total Semester Credit Hours		**17-19**

[1] A higher-level subject can be taken in the same category with advisor approval.

Program Specific Degree Requirements

(53 semester hours, must pass each course with a grade of "C" or higher.)

- Topics courses (BIOL 196/BIOL 296/BIOL 396/BIOL 496) as well as research courses (BIOL 387/BIOL 487), internships (BIOL 499), teaching practicum (BIOL 493), and independent study (BIOL 495) may not be used as Additional Biology Courses but must be used for elective credit.

Code	Title	Semester Credit Hours
Core Courses		
BIOL 208 & 208L	Fundamentals of Ecology and Evolution and Fundamentals of Ecology and Evolution Laboratory	4
BIOL 301 & 301L	Principles of Genetics and Principles of Genetics Laboratory	4
BIOL 483	Senior Thesis	2
Required Related Study Area		
BIOL 108 & 108L	Diversity of Organisms-GTSC1 and Diversity of Organisms Laboratory-GTSC1	4
BIOL 302	Cellular Biology	3
BIOL 310 & 310L	Developmental Biology and Developmental Biology Laboratory	4
BIOL 371L	Laboratory Investigations in Cellular and Molecular Biology	3
BIOL 425	Molecular Genetics	3
CHEM 311 & 311L	Organic Chemistry I and Organic Chemistry I Laboratory	5
CHEM 312 & 312L	Organic Chemistry II and Organic Chemistry II Laboratory	5
CHEM 315	Biochemistry I	3
Additional Biology Courses		
Select 13 semester hours from the following lists		13
Category 1: Cellular, Developmental, and Molecular		
BIOL 250 & 250L	Introduction to Microbiology-GTSC1 and Introduction to Microbiology Laboratory-GTSC1	
BIOL 343	Immunology	
BIOL 344 & 344L	Forensic Molecular Biology and Forensic Molecular Biology Laboratory	
BIOL 442	Pharmacology	
CHEM 317L	Biochemistry Laboratory	
CHEM 316	Biochemistry II	
Category 2: Organismal		
BIOL 316 & 316L	Animal Behavior and Animal Behavior Laboratory	
BIOL 322 & 322L	Plant Identification and Plant Identification Laboratory	
BIOL 331 & 331L	Insect Biology and Insect Biology Laboratory	

BIOL 333	Marine Biology
BIOL 335 & 335L	Invertebrate Zoology and Invertebrate Zoology Laboratory
BIOL 336 & 336L	Fish Biology and Fish Biology Laboratory
BIOL 338	Small Mammal Biology
BIOL 350 & 350L	Microbiology and Microbiology Laboratory
BIOL 411 & 411L	Mammalogy and Mammalogy Laboratory
BIOL 412 & 412L	Ornithology and Ornithology Laboratory
BIOL 413 & 413L	Herpetology and Herpetology Laboratory
BIOL 431 & 431L	Animal Parasitology and Animal Parasitology Laboratory
BIOL 433	Marine Invertebrate Communities
BIOL 450 & 450L	Mycology and Mycology Laboratory
Category 3: Anatomical and Physiological	
BIOL 209 & 209L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory
BIOL 210 & 210L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory
BIOL 241	Pathophysiology
BIOL 351 & 351L	Ecological Physiology and Ecological Physiology Laboratory
BIOL 352 & 352L	Human Physiology and Human Physiology Laboratory
BIOL 409 & 409L	Gross and Developmental Human Anatomy and Gross and Developmental Human Anatomy Laboratory
BIOL 410 & 410L	Human Osteology and Human Osteology Laboratory
BIOL 427 & 427L	Plant Anatomy and Physiology and Plant Anatomy and Physiology Laboratory
BIOL 441	Endocrinology
Category 4: Ecology, Evolution, and Systematics	
BIOL 211 & 211L	Ecosystem Biology and Ecosystem Biology Laboratory
BIOL 315	Epidemiology
BIOL 320	Plant Systematics
BIOL 321 & 321L	Taxonomy of Grasses and Taxonomy of Grasses Laboratory
BIOL 403	Evolution
BIOL 405 & 405L	Advanced Ecological Methods and Advanced Ecological Methods Laboratory
BIOL 406	Plant-Animal Interactions
BIOL 407	Tropical Field Biology
BIOL 408	Desert Ecology
BIOL 414 & 414L	Freshwater Ecology and Freshwater Ecology Laboratory
BIOL 415	Tropical Ecosystems
BIOL 418 & 418L	Wildlife Management and Wildlife Field Techniques
BIOL 419 & 419L	Fisheries Management and Fisheries Management Laboratory
BIOL 420	Conservation Biology
Total Semester Credit Hours	**53**

General Electives

All college level courses appearing on your final transcript, not listed above that will bring your total semester hours to 120 hours, including 40 upper-division hours. 11-13 semester hours; up to 7 hours of upper division may be needed. Research courses are recommended.

Code	Title	Semester Credit Hours
MATH 151	Calculus I-GT-MA1	2
CHEM 131 & 131L	General Chemistry I-GTSC1 and General Chemistry Laboratory I-GTSC1	1
CHEM 132 & 132L	General Chemistry II-GTSC1 and General Chemistry Laboratory II-GTSC1	2
Select additional electives		6-8
Total Semester Credit Hours		**11-13**

Suggested Course Plan

First Year		
Fall Semester		**Semester Credit Hours**
BIOL 105 & 105L	Attributes of Living Systems-GTSC1 and Attributes of Living Systems Laboratory-GTSC1	4
CHEM 131 & 131L	General Chemistry I-GTSC1 and General Chemistry Laboratory I-GTSC1	5
MATH 151	Calculus I-GT-MA1	5
KINE 100	Health and Wellness	1
	Semester Credit Hours	**15**
Spring Semester		
BIOL 108 & 108L	Diversity of Organisms-GTSC1 and Diversity of Organisms Laboratory-GTSC1	4
CHEM 132 & 132L	General Chemistry II-GTSC1 and General Chemistry Laboratory II-GTSC1	5
STAT 200 or MATH 152	Probability and Statistics-GTMA1 or Calculus II	3-5
ENGL 111	English Composition I-GTCO1	3
	Semester Credit Hours	**15-17**
Second Year		
Fall Semester		
BIOL 208 & 208L	Fundamentals of Ecology and Evolution and Fundamentals of Ecology and Evolution Laboratory	4
CHEM 311 & 311L	Organic Chemistry I and Organic Chemistry I Laboratory	5
ENGL 112	English Composition II-GTCO2	3
Essential Learning - Social and Behavioral Sciences		3
	Semester Credit Hours	**15**
Spring Semester		
BIOL 301 & 301L	Principles of Genetics and Principles of Genetics Laboratory	4
CHEM 312 & 312L	Organic Chemistry II and Organic Chemistry II Laboratory	5
Essential Learning - History		3
Essential Learning - Humanities		3
	Semester Credit Hours	**15**

Third Year		
Fall Semester		
BIOL 302	Cellular Biology	3
PHYS 111 & 111L	General Physics I-GTSC1 and General Physics I Laboratory-GTSC1	5
CHEM 315	Biochemistry I	3
ESSL 290	Maverick Milestone	3
ESSL 200	Essential Speech	1
	Semester Credit Hours	**15**
Spring Semester		
BIOL 310 & 310L	Developmental Biology and Developmental Biology Laboratory	4
PHYS 112 & 112L	General Physics II-GTSC1 and General Physics II Laboratory-GTSC1	5
Essential Learning - Social and Behavioral Sciences		3
KINA Activity		1
	Semester Credit Hours	**13**
Fourth Year		
Fall Semester		
BIOL 371L	Laboratory Investigations in Cellular and Molecular Biology	3
Essential Learning - Fine Arts		3
Additional Biology Course		4
Electives (2 courses)		5
	Semester Credit Hours	**15**
Spring Semester		
BIOL 425	Molecular Genetics	3
BIOL 483	Senior Thesis	2
Additional Biology Courses		8
Elective [1]		4
	Semester Credit Hours	**17**
	Total Semester Credit Hours	**120-122**

[1] Less elective hours may be needed. Adequate elective hours must be taken to bring total semester hours to 120, including 40 upper-division hours.

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 their 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 their responsibility to consult the Registrar's Office regarding next steps.