

# BIOLOGY: CELLULAR & MOLECULAR BIOSCIENCES CONCENTRATION, BACHELOR OF SCIENCE

## Student Learning Outcomes

1. Students will develop a broad-based knowledge of concepts and terminology in molecular, cellular, organismal, and ecological biology.
2. Students will develop applied scientific skills through field and laboratory experience and data analysis.
3. Students will develop skills in reading and interpreting the scientific literature and in presenting a synthesis of it accurately in oral and written form.
4. Students will demonstrate critical thinking and problem solving skills using experimental design and the scientific method.

## Outcomes Assessment Activities

- Assessment of students' improvement in intellectual skills, knowledge and capacities from entrance to graduation will be accomplished through the use of several tools. Exams and course assignments will be used as one measure of the student's proficiency in writing skills, acquisition of knowledge, communication, problem solving and laboratory skills. All majors will take a Senior Seminar that requires scientific literature interpretation along with oral and written presentations evaluated by peers and department faculty. Seniors will also take the Biology Major Field Test, which measures Colorado State University Pueblo students' content knowledge and analytical skills against national norms.

## Specific Program Requirements

### Program Overview

Requirement	Credits
General Education	21
Biology Core	30
Biology Upper Division Electives	15
Biology Support Courses	38-40
Open Electives	14-16
<b>Total Credits</b>	<b>118-122</b>

### Specific Core Requirements

Course	Title	Credits
BIOL 171	First Year Seminar	1
BIOL 181 & 181L	College Biology I/Organismal Bio (GT-SC2) and College Biology I/Organismal Bio Lab (GT-SC1)	4
BIOL 182 & 182L	College Biology II/Cellular Biology (GT-SC2) and College Biology II/Cellular Bio Lab (GT-SC1)	4
BIOL 312 & 312L	Cell Biology and Cell Biology Laboratory	4
BIOL 350	Mendelian and Population Genetics	2
BIOL 351	Molecular Biology & Genetics	3
BIOL 352	Evolutionary Biology and Ecology	3
BIOL 493	Seminar	1

Select one of the following two organismal courses:		4
BIOL 201 & 201L	Botany (GT-SC2) and Botany Laboratory (GT-SC1)	4
BIOL 202 & 202L	Zoology and Zoology Laboratory	4
Select one of the following four microbiology or physiology courses:		4
BIOL 301 & 301L	General Microbiology and General Microbiology Lab	3
BIOL 412 & 412L	Advanced Cellular Biology and Advanced Cellular Biology Lab	4
BIOL 413 & 413L	Plant Physiology and Plant Physiology Lab	4
BIOL 414 & 414L	Vertebrate Physiology and Vertebrate Physiology Lab	4
<b>Total Credits</b>		<b>30</b>

## Specific Concentration Requirements

Course	Title	Credits
<b>Required Biology Core Courses</b>		<b>30</b>
<b>Required Courses</b>		<b>5</b>
BIOL 351L	Molecular Biology & Genetics Laboratory	2
CHEM 311	Biochemistry Survey	3
	or CHEM 411 Biochemistry I	
<b>Advisor Approved Upper Division Biology Electives</b>		<b>6</b>
<b>Required Support Courses</b>		<b>30</b>
CHEM 121 & 121L	General Chemistry I (GT-SC2) and General Chemistry Lab I (GT-SC1)	5
CHEM 122 & 122L	General Chemistry II (GT-SC2) and General Chemistry Lab II (GT-SC1)	5
CHEM 301 & 301L	Organic Chemistry I and Organic Chemistry Lab I	5
CHEM 302 & 302L	Organic Chemistry II and Organic Chemistry Lab II	5
CID 103	Speaking & Listening	3
MATH 156	Introduction to Statistics (GT-MA1)	3
MATH 221	Applied Calc: An Intuitive Approach (GT-MA1)	4
<b>Select one of the following sequences:</b>		<b>8-10</b>
Sequence A:		
PHYS 201 & 201L	Principles of Physics I (GT-SC2) and Principles of Physics Lab I (GT-SC1)	4
PHYS 202 & 202L	Principles Of Physics II (GT-SC2) and Principles Of Physics II Lab (GT-SC1)	4
Sequence B:		
PHYS 221 & 221L	General Physics I and General Physics I Lab (GT-SC1)	5
PHYS 222 & 222L	General Physics II and General Physics II Lab (GT-SC1)	5
<b>Institutional &amp; General Education</b>		<b>21</b>
<b>Open Electives (14-16 credits)</b>		<b>16-14</b>
<b>Total Credits</b>		<b>116</b>

## Planning Sheet

Disclaimer: The Planning Sheet is designed as a guide for student's planning their course selections. The information on this page provides only a suggested schedule. Actual course selections should be made

with the advice and consent of an academic advisor. While accurately portraying the information contained in the college catalog, this form is not considered a legal substitute for that document. Students should become familiar with the catalog in effect at the time in which they entered the institution.

Course	Title	Credits
<b>Year 1</b>		
<b>Fall</b>		
BIOL 171	First Year Seminar	1
BIOL 181 & 181L	College Biology I/Organismal Bio (GT-SC2) and College Biology I/Organismal Bio Lab (GT-SC1)	4
CHEM 111	Principles of Chemistry (GT-SC2)	3
MATH 120 or MATH 156 or MATH 221	College Algebra (GT-MA1) or Introduction to Statistics (GT-MA1) or Applied Calc: An Intuitive Approach (GT-MA1)	3-4
ENG 101	Rhetoric & Writing I (GT-CO1)	3
<b>Credits</b>		<b>14-15</b>
<b>Spring</b>		
BIOL 182 & 182L	College Biology II/Cellular Biology (GT-SC2) and College Biology II/Cellular Bio Lab (GT-SC1)	4
CHEM 121 & 121L	General Chemistry I (GT-SC2) and General Chemistry Lab I (GT-SC1)	5
MATH 120 or MATH 156 or MATH 221	College Algebra (GT-MA1) or Introduction to Statistics (GT-MA1) or Applied Calc: An Intuitive Approach (GT-MA1)	3-4
ENG 102 or ENG 115	Rhetoric & Writing II (GT-CO2) or Technical Writing (GT-CO2)	3
<b>Credits</b>		<b>15-16</b>
<b>Year 2</b>		
<b>Fall</b>		
BIOL 201 & 201L or BIOL 202/202L or BIOL 352	Botany (GT-SC2) or Zoology or Evolutionary Biology and Ecology	3-4
BIOL 350	Mendelian and Population Genetics	2
CHEM 122 & 122L	General Chemistry II (GT-SC2) and General Chemistry Lab II (GT-SC1)	5
MATH 120 or MATH 156 or MATH 221	College Algebra (GT-MA1) or Introduction to Statistics (GT-MA1) or Applied Calc: An Intuitive Approach (GT-MA1)	3-4
<b>Credits</b>		<b>13-15</b>
<b>Spring</b>		
BIOL 201 & 201L or BIOL 202/202L or BIOL 352	Botany (GT-SC2) or Zoology or Evolutionary Biology and Ecology	3-4
BIOL 312 & 312L	Cell Biology and Cell Biology Laboratory	4
CHEM 301 & 301L	Organic Chemistry I and Organic Chemistry Lab I	5
CID 103	Speaking & Listening	3
<b>Credits</b>		<b>15-16</b>
<b>Year 3</b>		
<b>Fall</b>		
BIOL 351	Molecular Biology & Genetics	3
BIOL 3XX	Physiology Core	4
CHEM 302 & 302L	Organic Chemistry II and Organic Chemistry Lab II	5
PHYS 201 or PHYS 221	Principles of Physics I (GT-SC2) or General Physics I	3-4
<b>Credits</b>		<b>15-16</b>
<b>Spring</b>		
BIOL Electives		6
PHYS 202 or PHYS 222	Principles Of Physics II (GT-SC2) or General Physics II	3-4

General Education Courses	6
<b>Credits</b>	<b>15-16</b>
<b>Year 4</b>	
<b>Fall</b>	
BIOL/CHEM Electives <sup>Biochemistry</sup>	6
General Education Courses	6
General Electives	3
<b>Credits</b>	<b>15</b>
<b>Spring</b>	
BIOL Electives <sup>Immunology</sup>	3
BIOL 493 Seminar	1
General Education Courses	3
General Electives	7
<b>Credits</b>	<b>14</b>
<b>Total Credits</b>	<b>116-123</b>