BIOLOGY, BACHELOR OF SCIENCE (BS) - CONCENTRATION IN CELLULAR AND MOLECULAR BIOLOGY - CONCENTRATION IN BIOINFORMATICS

Program Learning Outcomes

- **Competence in Laboratory and Research Skills: To conduct, assess, and communicate research investigations using established scientific practices.** (SRU UG 1, 2, 3, 4, 5, 7 10)
- **Core Concepts for Biological Literacy:** (SRU UG 1, 2, 3, 4, 5, 7, 9)
  - Knowledge/Content
    - Evolution
    - Structure and function across all levels of biological organization
    - Diversity and interactions of life
    - Information flow, exchange and storage in biological systems
  - Critical Thinking/Problem Solving
    - Connect information from cognate science courses and liberal arts courses to biological concepts
    - Apply scientific information to current and future societal problems
- **Participation in Diverse, Enriching Scientific Activities:** Apply technical and professional skills in hands-on laboratory, clinical or field experiences. (SRU UG 1, 2, 3, 4, 5, 7, 8, 9)
- **Professional Attitude:** Graduates demonstrate professional attitude, behavior, and ability to interact with people from diverse backgrounds and cultures. (SRU UG 1, 5, 7, 8, 9)

Related Links

Biology - Cellular and Molecular Biology - Bioinformatics, BS Program Page (https://www.sru.edu/academics/majors-and-minors/biology-bioinformatics-and-computational-biology/)

Professional Licensure/Certification Page (https://www.sru.edu/students/student-consumer-information/professional-licensures/)

Curriculum Guide

GPA Requirement

Major GPA: 2.0 or higher
Overall GPA: 2.0 or higher
Core GPA: 2.0 or higher

Summary*

Code	Title	Hours
Rock Studies 2 Requirements		45
Major Requirements/Concentration		76
Natural Science and Math College-Wide Requirements		12
Electives		15

* All undergraduate degree programs require a minimum of 120 credits. Some courses meet multiple requirements, but are only counted once toward the 120 credit total required to graduate.

Rock Studies 2 Requirements

Code	Title	Hours
The Rock		
SUBJ 139	University Seminar [1]	3
ENGL 102	Critical Writing	3
ENGL 104	Critical Reading	3
MATH 125	Precalculus	4
or MATH 225	Calculus I	
Select one of the following:		3
COMM 200	Civil Discourse: Theory & Practice	
PHIL 110	Ethics and Civil Discourse	
POLI 235	Civil Discourse and Democracy	
Subtotal		16
Integrated Inquiry		
Creative and Aesthetic Inquiry		
Select 3 Credits (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
Humanities Inquiry		
Select 3 Credits (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
Social Science Inquiry		
Select 3 Credits (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
Natural Sciences Inquiry		
CHEM 107	General Chemistry I	3
CHEM 111	General Chemistry I Lab	1
Physical Sciences Inquiry		
PHYS 201	Elements of Physics I with Lab	4
or PHYS 216	University Physics 1 with Lab	
Subtotal		17
Thematic Thread		
Select 12 Credits (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/) [2]		12
Total Hours		**45**

[1] Course offered in multiple subjects; cannot take course in first major subject

[2] One course from each category; six credits must be 300-level or above; no more than 4 credits from one subject area; specific courses required in first major, regardless of prefix of course, cannot be used to satisfy thread requirements; any course with same prefix as first major cannot be used to satisfy thread requirements, even if it is not a course in the first major.

DIVERSITY, EQUITY, AND INCLUSION REQUIREMENT

Students must take and pass a course with the Diversity, Equity, and Inclusion (DEI) designation prior to graduation. Students can meet this requirement by taking any DEI - designated course in any program at any time during their undergraduate career.

Major Requirements/Concentration

- 30 major credits must be taken at SRU or PASSHE
- 30 major credits must be taken at the 300 level or above
- Students desiring a Biology Major must maintain at least a 2.000 average in Biology.
- Students must earn a "C" or better in both Biology I with Lab (BIOL 113) and Biology II with Lab (BIOL 114) before proceeding to their next biology course.
- Students must earn a "B" or better in both Genetics with Lab BIOL 250) and Biometry with Lab (BIOL 325) prior to graduating.

Code	Title	Hours
Biology Core Requirements		
BIOL 113	Biology I: Foundations of Ecology, Evolution and Diversity with Lab [1]	4
BIOL 114	Biology II: Foundations of Molecules, Genes and Cells with Lab [1]	4
BIOL 250	Genetics with Lab [1]	4
BIOL 325	Biostatistics and Experimental Design with Lab [1]	3
Subtotal		15
Required Upper-Level Biology		
BIOL 335	Cell Biology [1]	3
BIOL 350	Evolution [1]	3
BIOL 370	Molecular Biology [1]	3
BIOL 435	Cellular and Molecular Analysis Laboratory [1]	3
BIOL 410	Animal Physiology with Lab [1]	3
BIOL 492	Biology Seminar [1]	1
Subtotal		16
Upper-Level Biology Electives		
Select 6 credits in BIOL or MARS course from Additional Upper-Level Biology Electives that have not been used above.		6
Upper-Level Electives (p. 2) [1]		
Subtotal		6
Related Sciences – Chemistry		
CHEM 108	General Chemistry II [2]	3
CHEM 112	General Chemistry II Lab [2]	1
CHEM 201	Organic Chemistry I [2]	3
CHEM 211	Organic Chemistry Laboratory I [2]	1
Subtotal		8
Related Sciences – Chemistry Advanced Elective		
CHEM 202	[2]	
CHEM 212	[2]	
CHEM 335	Biochemistry I [2]	3
CHEM 336	Biochemistry Laboratory I [2]	1
Related Sciences – Physics		
Select one of the following:		4
PHYS 202	Elements of Physics II/ Lab [1]	
PHYS 217	University Physics 2 with Lab [1]	
Independent Study/Internship Options		
Select one of the following options:		3
Independent Study Option		
BIOL 490	Independent Study [1]	
or BIOL 450	Biology Internship	
Non-Independent Study Option		
Select 3 credits in BIOL or MARS course from Additional Upper-Level Biology Electives that have not been used above.		
Upper-Level Biology Electives (p. 2) [1]		
Subtotal		11
Total Hours		**56**

[1] Course counts for 50% of Major requirements and Major GPA
[2] Course counts for 50% of Major requirements but not for Major GPA
* Some courses may require pre-requisites. Please see course descriptions to determine if there are any pre-requisites for that specific course.

Natural Science and Math College-Wide Requirements

Code	Title	Hours
CHEM 107	General Chemistry I	3
CHEM 111	General Chemistry I Lab	1
MATH 125	Precalculus	4
or MATH 225	Calculus I	
PHYS 201	Elements of Physics I with Lab	4
or PHYS 216	University Physics 1 with Lab	

Concentration in Bioinformatics Requirements

Code	Title	Hours
CPSC 146	Programming Principles	3
CPSC 246	Object-Oriented Programming	3
CPSC 374	Algorithms and Data Structures	3
CPSC 480	Topics in Computer Science: Machine Learning	3
MATH 230	Calculus II	4
Total Hours		**16**

Additional Upper-Level Biology Electives

Code	Title	Hours
BIOL 209	Advanced Human Anatomy and Physiology I with Laboratory [1]	4
BIOL 301	Forest Ecology [1]	3
BIOL 302	Ecology of Amphibians & Reptiles/Lab [1]	3
BIOL 303	Behavioral Ecology/Lab [1]	3
BIOL 305	Wetlands and Aquatic Plants/Lab [1]	3
BIOL 306	Freshwater Biomonitoring/Lab [1]	3
BIOL 307	Vertebrate Ecology/Lab [1]	3
BIOL 308	Aquatic Ecosystem Management / Lab [1]	3
BIOL 309	Advanced Human Anatomy and Physiology II with Laboratory	4
BIOL 310	Plant Diversity with Lab [1]	3
BIOL 311	Entomology/Lab [1]	3
BIOL 312	Zoology with Lab	3
BIOL 313	Herpetology/Lab [1]	3
BIOL 314	Parasitology with Lab [1]	3
BIOL 316	Immunology with Lab [1]	3
BIOL 317	Ecology and Fungi [1]	3
BIOL 320	Ornithology/Lab [1]	3

BIOL 321	Wildlife Management/Lab [1]	3
BIOL 322	Conservation Biology/Lab [1]	3
BIOL 323	Stream Ecology/Lab [1]	3
BIOL 326	Field Methods in Biogeography/Lab [1]	3
BIOL 327	Limnology/Lab [1]	3
BIOL 330	Microbiology/Lab	3
BIOL 331	Mammology/Lab [1]	3
BIOL 340	Vertebrate Anatomy with Lab	3
BIOL 343	Embryology with Lab [1]	3
BIOL 356	Field Ecology / Lab [1]	3
BIOL 357	Environmental Microbiology with Lab [1]	4
BIOL 360	Field Botany [1]	3
BIOL 361	Flora of Western Pennsylvania [1]	3
BIOL 371	Vertebrate Field Zoology [1]	3
BIOL 373	Ichthyology/Lab [1]	3
BIOL 375	Ecology of Fish / Lab [1]	3
BIOL 380	Endocrinology [1]	3
BIOL 395	Workshop	1-6
BIOL 398	Selected Topics	1-3
BIOL 400	Disease Ecology [1]	3
BIOL 401	Ecology with Lab	3
BIOL 402	Biogeography/Lab [1]	3
BIOL 405	Animal Physiological Ecology with Lab [1]	4
BIOL 409	Pathophysiology [1]	3
BIOL 412	Population Biology [1]	3
BIOL 430	Pathogenic Microbiology [1]	3
BIOL 450	Biology Internship [1]	3
BIOL 451	Plant Physiology/Lab	3
BIOL 470	Histology with Lab [1]	3
BIOL 495	Workshop	1-6
BIOL 498	Selected Topics [1]	3
MRSC 300	Behavior of Marine Organisms [1]	3
MRSC 310	The Mammals of Coastal Ecosystems [1]	3
MRSC 320	Marine Microbiology [1]	3
MRSC 330	Tropical Invertebrates	3
MRSC 342	Marine Botany [1]	3
MRSC 343	Marine Ichthyology [1]	3
MRSC 344	Anatomy of Marine Chordates [1]	3
MRSC 345	Ornithology [1]	3
MRSC 350	Physiology of Marine Invertebrates [1]	3
MRSC 398	Selected Topics [1]	1-3
MRSC 420	Marine Micropaleontology [1]	3
MRSC 431	Ecology of Marine Plankton [1]	3
MRSC 441	Biology of Molluscs [1]	3
MRSC 490	Independent Study [1]	1-3
MRSC 491	Coral Reef Ecology [1]	3
MRSC 492	Marine Mammals [1]	3
MRSC 498	Selected Topics [1]	1-3
MRSC 500	Problems in Marine Science [1]	3

[1] Course counts for 50% of Major requirements and Major GPA

Co-curricular and Experiential Learning

Students are encouraged to explore additional curricular and co-curricular opportunities. There is a strong correlation between long-term student success and participation in the following types of programs and activities:

1. Student-faculty research
2. Internships
3. Volunteering
4. Job Shadowing

Important Curriculum Guide Notes

This Curriculum Guide is provided to help SRU students and prospective students better understand their intended major curriculum. Enrolled SRU students should note that the My Rock Audit may place already-earned and/or in progress courses in different, yet valid, curriculum categories. Enrolled SRU students should use the My Rock Audit Report and materials and information provided by their faculty advisers to ensure accurate progress towards degree completion. *The information on this guide is current as of the date listed. Students are responsible for curriculum requirements at the time of enrollment at the University*.

PASSHE - Pennsylvania State System of Higher Education Institutions

BIOLOGY - BS (6108) / CIM 76
Concentration in Cellular and Molecular Biology (CEMB)
w/optional Concentration in Bioinformatics (BIIF)
This program is effective as of Summer 2023
Revised 07.09.2025
UCC 02.25.2025

RECOMMENDED FOUR-YEAR PLAN

Course	Title	Hours
First Year		
Fall		
BIOL 113	Biology I: Foundations of Ecology, Evolution and Diversity with Lab	4
CHEM 107	General Chemistry I	3
CHEM 111	General Chemistry I Lab	1
ENGL 102	Critical Writing	3
ESAP 101	FYRST Seminar *	1
SUBJ 139	Foundations of Academic Discovery [1]	3
	Hours	**15**
Spring		
BIOL 114	Biology II: Foundations of Molecules, Genes and Cells with Lab	4
CHEM 108	General Chemistry II	3
CHEM 112	General Chemistry II Lab	1
ENGL 104	Critical Reading	3
MATH 225	Calculus I	4
	Hours	**15**
Second Year		
Fall		
BIOL 250	Genetics with Lab	4
CHEM 201	Organic Chemistry I	3
CHEM 211	Organic Chemistry Laboratory I	1
CPSC 146	Programming Principles	3

Select one of the following:		3
COMM 200	Civil Discourse: Theory & Practice	
PHIL 110	Ethics and Civil Discourse	
POLI 235	Civil Discourse and Democracy	
MATH 230	Calculus II	4
Declare a Thematic Thread [2]		
	Hours	**18**
Spring		
BIOL 325	Biostatistics and Experimental Design with Lab	3
Select one of the following:		3
CHEM 304 & CHEM 314	Organic Chemistry II and Organic Chemistry Laboratory II	
BIOL 300+	Upper Level BIOL Elective	
CPSC 246	Object-Oriented Programming	3
Social Science Inquiry (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
Thematic Thread Requirement (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
	Hours	**15**
Third Year		
Fall		
BIOL 340	Vertebrate Anatomy with Lab	3
CHEM 335 or CHEM 301	Biochemistry I or Physical Chemistry I	3
Creative & Aesthetic Inquiry (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
Thematic Thread Requirement (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
Thematic Thread Requirement (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
	Hours	**15**
Spring		
BIOL 330	Microbiology/Lab	3
BIOL 335	Cell Biology	3
BIOL 435	Cellular and Molecular Analysis Laboratory	3
CPSC 374	Algorithms and Data Structures	3
Humanities Inquiry (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
	Hours	**15**
Fourth Year		
Fall		
BIOL 300+	Upper Level BIOL Elective	3
Thematic Thread Requirement (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/)		3
BIOL 401	Ecology with Lab	3
PHYS 201 or PHYS 216	Elements of Physics I with Lab or University Physics 1 with Lab	4
Elective with DEI attribute		3
	Hours	**16**
Spring		
BIOL 450	Biology Internship	3
BIOL 490	Independent Study	3
BIOL 492	Biology Seminar	1
BIOL 300+	Upper Level BIOL Elective	3
PHYS 202 or PHYS 217	Elements of Physics II/ Lab or University Physics 2 with Lab	4
CPSC 480	Topics in Computer Science: Machine Learning	3
	Hours	**17**
	Total Hours**	**126**

[1] Course offered in multiple subjects; cannot take course in first major subject.

[2] Work with your Academic Adviser to declare a Thematic Thread by the end of your fall semester in your second year.

* Students are encouraged to take ESAP 101 as a Free Elective.

Major/Concentration: 6108/CEMB/BIFF
Revised: 08.04.2026