

BIOLOGY, BACHELOR OF SCIENCE (BS) - CONCENTRATION IN PROFESSIONAL - CONCENTRATION IN BIOINFORMATICS

Program Learning Outcomes

- **Competence in Laboratory and Research Skills:** To conduct, assess, and communicate research investigations using established scientific practices.
- **Core Concepts for Biological Literacy:**
 - 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.
- **Professional Attitude:** Graduates demonstrate professional attitude, behavior, and ability to interact with people from diverse backgrounds and cultures.

Related Links

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

Biology Department Page (<https://www.sru.edu/academics/colleges-and-departments/ches/departments/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
	Other Basic Requirements	0-3
	Computer Competency	0-3
	Major Requirements/Concentration	59
	Natural Science and Math College-Wide Requirements	12
	Electives	16

* 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 or MATH 225	Precalculus Calculus I	4
Select one of the following:		3
COMM 200	Civil Discourse: Theory & Practice	
PHIL 110	Ethics and Civil Discourse	
POLS 235	Civil Discourse and Democracy	
Subtotal		16
Integrated Inquiry		
<i>Creative and Aesthetic Inquiry</i>		
Select 3 Credits (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)		3
<i>Humanities Inquiry</i>		
Select 3 Credits (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)		3
<i>Social Science Inquiry</i>		
Select 3 Credits (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)		3
<i>Natural Sciences Inquiry</i>		
CHEM 107	General Chemistry I	3
CHEM 111	General Chemistry I Lab	1
<i>Physical Sciences Inquiry</i>		
PHYS 201 or PHYS 216	Elements of Physics I with Lab University Physics 1 with Lab	4
Subtotal		17
Thematic Thread		
Select 12 Credits (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/) 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.

Basic Math Requirement

Check with your adviser or a current degree audit report to see if you have been exempted from this course. The credit earned in this course will not be counted toward the 120 credit hour minimum needed to earn a degree.

Code	Title	Hours
Complete one of the following:		0-3
Meet required minimum SAT or ACT math score OR		
ESAP 110	Beginning Algebra	
Total Hours		0-3

Computer Competency

Code	Title	Hours
Demonstrate "computer competency" by one of the following:		0-3
Pass Computer Competency Exam OR		
Select one of the following at SRU or another post-secondary institution:		
CPSC 100	Introduction to Computing for Liberal Arts	
CPSC 110	Computer Concepts	
CPSC 130	Introduction to Computing and Programming	
PE 202	Technology for Wellness	
Total Hours		0-3

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	4
BIOL 114	Biology II: Foundations of Molecules, Genes and Cells with Lab	4
BIOL 250	Genetics with Lab ^{1,2}	4
BIOL 325	Biometry with Lab	3
Subtotal		15

Required Upper-Level Biology

BIOL 492	Biology Seminar ¹	1
Subtotal		1

Upper-Level Biology Electives

Select five courses of the following:		15
BIOL 330	Microbiology/Lab ¹	
BIOL 335	Cell Biology/Lab ¹	
BIOL 340	Vertebrate Anatomy with Lab ¹	
BIOL 370	Molecular Biology with Lab ¹	
BIOL 401	Ecology with Lab ¹	
BIOL 410	Animal Physiology with Lab ¹	
BIOL 451	Plant Physiology/Lab ¹	
Subtotal		15

Additional Upper-Level Biology Electives

Select six credits which can come from courses not chosen above, or any 300/400 level course listed below. Additional electives may be selected from the Marine Science offerings listed below. PLE courses are only offered during the summer months through our affiliation with Pymatuning Laboratory of Ecology.

Upper-Level Electives (p. 3)		6
Subtotal		6

Related Sciences – Chemistry

CHEM 108	General Chemistry II ³	3
CHEM 112	General Chemistry II Lab ³	1
CHEM 201	Organic Chemistry I ³	3
CHEM 202	Organic Chemistry II ³	3
CHEM 211	Organic Chemistry Laboratory I ³	1
CHEM 212	Organic Chemistry Laboratory II ³	1
Subtotal		12

Related Sciences – Chemistry Advanced Elective

Select one of the following:		3
CHEM 301	Physical Chemistry I ³	
CHEM 335	Biochemistry I ³	

Related Sciences – Physics

Select one of the following:		4
PHYS 202	Elements of Physics II/ Lab	
PHYS 217	University Physics 2 with Lab	

Independent Study Option

Select one of the following options:		3
<i>Independent Study Option</i>		
BIOL 490	Independent Study ³	

Non-Independent Study Option

Select 3 credits BIOL or MARS course from Additional Upper-Level Biology Electives below.

Upper-Level Biology Electives (p. 3)		
Subtotal		10

Major Field Test

Field Test required of all Biology students before graduation.

Total Hours		59
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¹ Course counts for 50% of Major requirements and Major GPA

² Core GPA

³ Course counts for 50% of Major requirements but not for Major GPA

⁴ With the exception of BIOL 300, BIOL 314, BIOL 315, BIOL 316, BIOL 319, BIOL 345

* 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	Advanced Programming Principles	3
CPSC 374	Algorithms and Data Structures	3
CPSC 480	Topics in Computer Science: Machine Learning	3
MATH 230	Calculus II	4

Additional Upper-Level Biology Electives

Code	Title	Hours
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 310	Plant Systematics with Lab ¹	3
BIOL 311	Entomology/Lab ¹	3
BIOL 313	Herpetology/Lab ¹	3
BIOL 314	Medical Parasitology with Lab ¹	1
BIOL 315	¹	1
BIOL 316	Medical Immunology with Lab ¹	1
BIOL 317	Ecology and Fungi ¹	3
BIOL 319	Medical Virology with a Lab	1
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 331	Mammology/Lab ¹	3
BIOL 343	Embryology with Lab ¹	3
BIOL 345	¹	2
BIOL 350	Evolution 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 402	Biogeography/Lab ¹	3
BIOL 405	Animal Physiological Ecology with Lab ¹	4
BIOL 412	Population Biology ¹	3
BIOL 430	Pathogenic Microbiology with Lab ¹	3
BIOL 450	Biology Internship ¹	3
BIOL 465	¹	3
BIOL 470	Histology with Lab ¹	3
BIOL 498	Selected Topics ¹	3
MARS 221	Marine Invertebrates ¹	3
MARS 241	Marine Biology ¹	3
MARS 250	Wetland Ecology ¹	3
MARS 260	Marine Ecology ¹	3
MARS 270	Coastal Vegetation ¹	3
MARS 298	Selected Topics ¹	3
MARS 300	Behavior of Marine Organisms ¹	3
MARS 310	The Mammals of Coastal Ecosystems ¹	3
MARS 320	Marine Microbiology ¹	3
MARS 330	Tropical Invertebrates	3
MARS 342	Marine Botany ¹	3
MARS 343	Marine Ichthyology ¹	3
MARS 344	Anatomy of Marine Chordates ¹	3
MARS 345	Ornithology ¹	3
MARS 350	Physiology of Marine Invertebrates ¹	3
MARS 398	Selected Topics ¹	3
MARS 420	Marine Micropaleontology ¹	3
MARS 431	Ecology of Marine Plankton ¹	3
MARS 441	Biology of Molluscs ¹	3
MARS 490	Independent Study ¹	3
MARS 491	Coral Reef Ecology ¹	3
MARS 492	Marine Mammals ¹	3
MARS 498	Selected Topics ¹	3
MARS 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)

Concentration in Professional (PRFL)

w/optional Concentration in Bioinformatics (BIIF)

This program is effective as of Summer 2022.

Revised 04.04.2022

UCC 02.01.2022

Recommended Four-Year Plan

Course	Title	Hours
First Year		
Fall		
ENGL 102	Critical Writing	3
BIOL 104		4
CHEM 107	General Chemistry I	3
CHEM 111	General Chemistry I Lab	1
SUBJ 139	Foundations of Academic Discovery ¹	3
ESAP 101	FIRST Seminar *	1
Hours		15
Spring		
ENGL 104	Critical Reading	3
Select one 200-level Core Course:		4
BIOL 201	General Botany with Lab	
BIOL 212	General Zoology with Lab	
BIOL 250	Genetics with Lab	
CHEM 108	General Chemistry II	3
CHEM 112	General Chemistry II Lab	1
Creative & Aesthetic Inquiry (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)		3
Hours		14
Second Year		
Fall		
Select one of the following:		3
COMM 200	Civil Discourse: Theory & Practice	
PHIL 110	Ethics and Civil Discourse	
POLS 235	Civil Discourse and Democracy	
Select one 200-level Core Course:		4
BIOL 201	General Botany with Lab	
BIOL 212	General Zoology with Lab	
BIOL 250	Genetics with Lab	
CHEM 201	Organic Chemistry I	3
CHEM 211	Organic Chemistry Laboratory I	1

Humanities Inquiry (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)	3
Social Science Inquiry (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)	3
Declare a Thematic Thread ²	

Hours **17**

Spring

Select one 200-level Core Course:	4	
BIOL 201	General Botany with Lab	
BIOL 212	General Zoology with Lab	
BIOL 250	Genetics with Lab	
CHEM 202	Organic Chemistry II	3
CHEM 212	Organic Chemistry Laboratory II	1
Thematic Thread Requirement (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)	3	
Thematic Thread Requirement (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)	3	

Hours **14**

Third Year

Fall

CHEM 335	Biochemistry I	3
or CHEM 301	or Physical Chemistry 1	
BIOL 300+	Upper Level BIOL Elective	3
BIOL 300+	Upper Level BIOL Elective	3
Thematic Thread Requirement (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)	3	
Thematic Thread Requirement (https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-quick-guide/)	3	

Hours **15**

Spring

MATH 225	Calculus I	4
BIOL 300+	Upper Level BIOL Elective	3
BIOL 300+	Upper Level BIOL Elective	3
Free Elective		3
Free Elective		2

Hours **15**

Fourth Year

Fall

PHYS 211	General Physics I with Lab	4
BIOL 300+	Upper Level BIOL Elective	3
BIOL 300+	Upper Level BIOL Elective	3
Free Elective		3
Free Elective		3

Hours **16**

Spring

Free Elective		3
PHYS 213	General Physics III/ Lab ³	4
BIOL 300+	Upper Level BIOL Elective	3
BIOL 490	Independent Study ⁴	3
BIOL 492	Biology Seminar	1

Hours **14**

Total Hours** **120**

- 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.
- ³ or BIOL 300/400 level (except BIOL 300, BIOL 314, BIOL 315, BIOL 316, BIOL 319, or BIOL 345).
- ⁴ or BIOL 300+:Upper Level BIOL Elective
- * Students are encouraged to take ESAP 101 as a Free Elective.

*** This document is meant to serve as a guide. Some planners may show more than 120 credits because faculty have created flexibility in choosing courses. However, only 120 credits are required to obtain a degree. Please consult with your academic adviser and refer to your curriculum guide prior to registering for courses. This plan should be reviewed, and verified, by you and your academic adviser at least once each academic year.*

Major Code: 6108

Concentration Code: PRFL

Revised date: 04.21.22