

# BIOLOGY, BACHELOR OF SCIENCE (BS) - CONCENTRATION IN INTEGRATIVE BIOLOGY / PRE-MASTER OF EDUCATION (7-12)

Students seeking state certification in secondary education must also complete requirements for a Master of Education degree, a one-year program at SRU. All of our programs are designed to steadily develop the quantitative, deductive and inductive reasoning skills that biologists must have.

All candidates completing this program and student teaching are eligible to receive Pennsylvania certification after achieving a passing or qualifying score on Pennsylvania Department of Education required exam(s). If you are interested in teaching in another state, please contact the Department of Education in that state.

## REQUIREMENTS FOR THE CERTIFICATION

Teacher certification is earned through the master of education degree at Slippery Rock University. Students seeking secondary school teaching certification in biology must earn a bachelor of arts or a bachelor of science degree in biology and contact the Department of Secondary Education/Foundations of Education concerning its graduate program in education. Information about this program, including prerequisites for admission, may be obtained from the Secondary Education/Foundations of Education office in 114 McKay Education Building.

## 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 - Integrative Biology, Pre-Masters of Education, BS Program Page (<https://www.sru.edu/academics/majors-and-minors/biology-pre-masters-of-education/>)

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	60
	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
<b>The Rock</b>		
SUBJ 139	Foundations of Academic Discovery <sup>1</sup>	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	
POLS 235	Civil Discourse and Democracy	
	Subtotal	16
<b>Integrated Inquiry</b>		
<i>Creative and Aesthetic Inquiry</i>		
	Select 3 Credits ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )	3
<i>Humanities Inquiry</i>		
	Select 3 Credits ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )	3
<i>Social Science Inquiry</i>		
	Select 3 Credits ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )	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 211	Elements of Physics I with Lab General Physics I with Lab	4
Subtotal		17
<b>Thematic Thread</b>		
Select 12 Credits ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> ) <sup>2</sup>		12
<b>Total Hours</b>		<b>45</b>

<sup>1</sup> Course offered in multiple subjects; cannot take course in first major subject

<sup>2</sup> 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	
<b>Total Hours</b>		<b>0-3</b>

## 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	
<b>Total Hours</b>		<b>0-3</b>

## 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
- 28 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 should complete all 200-level Biology requirements by the end of their sophomore year.

- To view the SRU policy on senior undergraduate students earning graduate credit, click here (<https://catalog.sru.edu/academic-policies/senior-undergraduate-students-earning-graduate-credit/>).

Code	Title	Hours
<b>Biology Core Requirements</b>		
BIOL 113	Biology I: Foundations of Ecology, Evolution and Diversity with Lab <sup>1</sup>	4
BIOL 114	Biology II: Foundations of Molecules, Genes and Cells with Lab <sup>1</sup>	4
BIOL 250	Genetics with Lab <sup>1</sup>	4
BIOL 325	Biostatistics and Experimental Design with Lab <sup>1</sup>	3
Subtotal		15
<b>Required Upper-Level Biology</b>		
BIOL 335 or BIOL 370	Cell Biology <sup>1</sup> Molecular Biology	3
BIOL 310	Plant Diversity with Lab (Now called Plant Diversity) <sup>1</sup>	3
BIOL 312	Zoology with Lab <sup>1</sup>	3
BIOL 350 or BIOL 401	Evolution <sup>1</sup> Ecology with Lab	3
BIOL 330	Microbiology/Lab <sup>1</sup>	3
Subtotal		15
<b>Upper-Level Biology Electives</b>		
Select 9 credits in BIOL or MARS courses from Additional Upper Level Biology Electives Below		9
Upper-Level Biology Electives (p. 3) <sup>1</sup>		
Subtotal		9
<b>Related Sciences – Chemistry</b>		
CHEM 108	General Chemistry II <sup>2</sup>	3
CHEM 112	General Chemistry II Lab <sup>2</sup>	1
CHEM 201	Organic Chemistry I <sup>2</sup>	3
CHEM 211	Organic Chemistry Laboratory I <sup>2</sup>	1
Subtotal		8
<b>Related Sciences – Additional Science Elective Options</b>		
Select one of the following:		3
CHEM 202	Organic Chemistry II <sup>1</sup>	
Upper-Level Biology Electives (p. 3) <sup>1</sup>		
Select one of the following:		3
CHEM 335	Biochemistry I <sup>1</sup>	
Upper-Level Biology Electives (p. 3) <sup>1</sup>		
Subtotal		6
<b>Related Sciences – Physics</b>		
Select one of the following:		
PHYS 202 or PHYS 217	Elements of Physics II/ Lab <sup>2</sup> University Physics 2 with Lab	4
Subtotal		4
<b>Independent Study Options</b>		
Select one of the following options:		3
<i>Independent Study Option</i>		
BIOL 490 or BIOL 450	Independent Study <sup>1</sup> Biology Internship	
<i>Non-Independent Study Option</i>		

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

Upper-Level Biology Electives (p. 3) <sup>1</sup>	
Subtotal	3
<b>Total Hours</b>	<b>60</b>

<sup>1</sup> Course counts for 50% of Major requirements and Major GPA

<sup>2</sup> Course counts for 50% of Major requirements but not for Major GPA

## Recommended Courses for Biology Pre-Masters in Education Majors

Listed below are the recommended courses for Biology Pre-Masters in Education majors. You will need to take these courses prior to obtaining your M. Ed.

Code	Title	Hours
SEFE 338	Standards-Based Instruction & Assessment in the Inclusionary Classroom	3
SPED 121	Overview of Special Education	3
One EGEO with Lab		4
Two Math courses (one must be Calculus)		6-8

Must take the following as part of your Upper-Class Biology Electives:

BIOL 370	Molecular Biology	
BIOL 401	Ecology with Lab	
BIOL 410	Animal Physiology with Lab	

## 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 211	General Physics I with Lab	

## Additional Upper-Level Biology Electives

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

BIOL 321	Wildlife Management/Lab <sup>1</sup>	3
BIOL 322	Conservation Biology/Lab <sup>1</sup>	3
BIOL 323	Stream Ecology/Lab <sup>1</sup>	3
BIOL 326	Field Methods in Biogeography/Lab <sup>1</sup>	3
BIOL 327	Limnology/Lab <sup>1</sup>	3
BIOL 331	Mammology/Lab <sup>1</sup>	3
BIOL 343	Embryology with Lab <sup>1</sup>	3
BIOL 350	Evolution <sup>1</sup>	3
BIOL 356	Field Ecology / Lab <sup>1</sup>	3
BIOL 357	Environmental Microbiology with Lab <sup>1</sup>	4
BIOL 360	Field Botany <sup>1</sup>	3
BIOL 361	Flora of Western Pennsylvania <sup>1</sup>	3
BIOL 371	Vertebrate Field Zoology <sup>1</sup>	3
BIOL 373	Ichthyology/Lab <sup>1</sup>	3
BIOL 375	Ecology of Fish / Lab <sup>1</sup>	3
BIOL 380	Endocrinology <sup>1</sup>	3
BIOL 400	Disease Ecology <sup>1</sup>	3
BIOL 402	Biogeography/Lab <sup>1</sup>	3
BIOL 405	Animal Physiological Ecology with Lab <sup>1</sup>	4
BIOL 409	Pathophysiology <sup>1</sup>	3
BIOL 412	Population Biology <sup>1</sup>	3
BIOL 430	Pathogenic Microbiology <sup>1</sup>	3
BIOL 435	Cellular and Molecular Analysis Laboratory <sup>1</sup>	3
BIOL 450	Biology Internship <sup>1</sup>	3
BIOL 470	Histology with Lab <sup>1</sup>	3
BIOL 498	Selected Topics <sup>1</sup>	3
MARS 221	Marine Invertebrates <sup>1</sup>	3
MARS 241	Marine Biology <sup>1</sup>	3
MARS 250	Wetland Ecology	3
MARS 260	Marine Ecology	3
MARS 270	Coastal Vegetation	3
MARS 298	Selected Topics	1-3
MARS 300	Behavior of Marine Organisms <sup>1</sup>	3
MARS 310	The Mammals of Coastal Ecosystems <sup>1</sup>	3
MARS 320	Marine Microbiology <sup>1</sup>	3
MARS 330	Tropical Invertebrates	3
MARS 342	Marine Botany <sup>1</sup>	3
MARS 343	Marine Ichthyology <sup>1</sup>	3
MARS 344	Anatomy of Marine Chordates <sup>1</sup>	3
MARS 345	Ornithology <sup>1</sup>	3
MARS 350	Physiology of Marine Invertebrates <sup>1</sup>	3
MARS 398	Selected Topics <sup>1</sup>	3
MARS 420	Marine Micropaleontology <sup>1</sup>	3
MARS 431	Ecology of Marine Plankton <sup>1</sup>	3
MARS 441	Biology of Molluscs <sup>1</sup>	3
MARS 490	Independent Study <sup>1</sup>	3
MARS 491	Coral Reef Ecology <sup>1</sup>	3
MARS 492	Marine Mammals <sup>1</sup>	3
MARS 498	Selected Topics <sup>1</sup>	3
MARS 500	Problems in Marine Science <sup>1</sup>	3

<sup>1</sup> 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)

w/optional Pre Masters in Education (7-12) (PX)

This program is effective as of Fall 2023

Revised 05.19.2023

UCC 11.29.2022

## RECOMMENDED FOUR-YEAR PLAN

Course	Title	Hours
<b>First Year</b>		
<b>Fall</b>		
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 <sup>1</sup>	3
<b>Hours</b>		<b>15</b>
<b>Spring</b>		
ENGL 104	Critical Reading	3
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
Creative & Aesthetic Inquiry ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )		3
<b>Hours</b>		<b>14</b>
<b>Second Year</b>		
<b>Fall</b>		
Select one of the following:		3

COMM 200	Civil Discourse: Theory & Practice	
PHIL 110	Ethics and Civil Discourse	
POLS 235	Civil Discourse and Democracy	
BIOL 250	Genetics with Lab	4
CHEM 201	Organic Chemistry I	3
CHEM 211	Organic Chemistry Laboratory I	1
Humanities Inquiry ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )		3
Social Science Inquiry ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )		3
<b>Hours</b>		<b>17</b>

<b>Spring</b>		
Select one of the following:		3-4
CHEM 202 & CHEM 212	Organic Chemistry II and Organic Chemistry Laboratory II	
BIOL 300+	Upper Level BIOL Elective	
BIOL 325	Biostatistics and Experimental Design with Lab	3
SPED 121	Overview of Special Education	3
Thematic Thread Requirement ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )		3
Thematic Thread Requirement ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )		3
<b>Hours</b>		<b>15-16</b>

<b>Third Year</b>		
<b>Fall</b>		
Select one of the following:		3
CHEM 335 or CHEM 301	Biochemistry I or Physical Chemistry I	
BIOL 300+	Upper Level BIOL Elective	
BIOL 310	Plant Diversity with Lab	3
BIOL 410	Animal Physiology with Lab	3
Thematic Thread Requirement ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )		3
Thematic Thread Requirement ( <a href="https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/">https://catalog.sru.edu/undergraduate/rock-studies/rock-studies-program/</a> )		3
<b>Hours</b>		<b>15</b>

<b>Spring</b>		
BIOL 330	Microbiology/Lab	3
BIOL 312	Zoology with Lab	3
MATH 125	Precalculus	4
Elective with DEI attribute		3
SEFE 338	Standards-Based Instruction & Assessment in the Inclusionary Classroom	3
<b>Hours</b>		<b>16</b>

<b>Fourth Year</b>		
<b>Fall</b>		
BIOL 370	Molecular Biology	3
BIOL 401	Ecology with Lab	3
MATH 225	Calculus I	4
PHYS 201 or PHYS 216	Elements of Physics I with Lab or University Physics 1 with Lab	4
<b>Hours</b>		<b>14</b>

**Spring**

PHYS 202 or PHYS 217	Elements of Physics II/ Lab or University Physics 2 with Lab	4
BIOL 300+	Upper Level BIOL Elective	3
BIOL 300+	Upper Level BIOL Elective	3
BIOL 490	Independent Study	3
BIOL 450	Biology Internship	3
<b>Hours</b>		<b>16</b>
<b>Total Hours**</b>		<b>122-123</b>

<sup>1</sup> Course offered in multiple subjects; cannot take course in first major subject.

\* 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/Concentration: 6108/INBI

Concentration Code: PX

Revised date: 05.19.2023