

# BIOLOGY (BS)

## Program Description

A BS in Biology provides a broader and more in depth preparation than the BA program for students pursuing a wide variety of professional careers in biology including post-graduate training.

## Entering and Completing the Major

In order to earn a degree, you must complete at least one academic major. SPU encourages students to explore various academic paths, so if you change your mind about a major, or want to include an additional program, you are able to do so, as outlined below.

Note that the University encourages you to enter your chosen major(s) as soon as you have determined it and are eligible to join it, especially by the start of your junior year. Students who transfer as juniors and seniors should enter a major within their first two quarters at SPU.

- If this is your first quarter at SPU and you identified a major in this department as your first choice on your application for admission to the University, you have gained entry to the major. To change or add a major, follow these instructions (<https://spu.atlassian.net/1/cp/a3th1keb/>).
- If you are an SPU student with an SPU cumulative GPA of 2.0 or better, follow these instructions (<https://spu.atlassian.net/1/cp/a3th1keb/>) to enter a major in this department.
- The University requires a grade of C- or better in all classes that apply to a major; however, programs may require higher minimum grades in specific courses. You may repeat an SPU course only once for a higher grade.
- To advance in this program, meet with your faculty advisor regularly to discuss your grades, course progression, and other indicators of satisfactory academic progress. If your grades or other factors indicate that you may not be able to successfully complete the major or minor, your faculty advisor can work with you to explore options, which may include choosing a different major.
- You must complete the major requirements that are in effect in the SPU Undergraduate Catalog for the year you enter the major.

## Biology (BS)

101 Credits Minimum, Including 33 Upper Division (UD)

Code	Title	Credits
<b>General Core Requirements</b>		
BIO 2101	General Biology	5
BIO 2102	General Biology	5
BIO 2103	General Biology	5
BIO 3325	Genetics	5
BIO 3899	Scientific Literature	1
BIO 4352	Cell Biology	5
BIO 4330	Evolutionary Mechanisms	5
Select one of the following:		5
BIO 4410	Human Physiology	
BIO 4413	Animal Physiology	
BIO 4415	Plant Physiology	
BIO 4256	Environmental Physiology	
BIO 4418	Neurobiology	

BIO 4419	Medical Virology	
Select one of the following:		5
BIO 3302	Coral Reef Ecology	
BIO 3303	Evolutionary Ecology in the Galapagos Islands	
BIO 3305	Marine Restoration Ecology	
BIO 3310	Ecology	
BIO 4810	Marine Ecology	
BIO 4815	Aquatic Ecology	
BIO 4825	Forest Ecology	
BIO 4835	Conservation Biology	
BIO 4840	Chemical Ecology	
Select one of the following:		5
BIO 3000	Introduction to Biological Anthropology	
BIO 3432	Biodiversity: Vertebrate Biology	
BIO 3453	Biodiversity: Plant Identification and Taxonomy	
BIO 4320	Principles of Development	
BIO 4435	Biodiversity: Parasites and Pests	
BIO 4744	Marine Botany	
Section Credits Required		46
<b>Required Supporting Courses</b>		
CHM 1211	General Chemistry I	5
CHM 1212	General Chemistry II	5
Select one of the following Groups:		5
Group A:		
CHM 3225	Quantitative Analysis and Equilibrium	
Group B:		
CHM 1213	General Chemistry III	
CHM 2213	Inorganic Qualitative Analysis	
Group C:		
BIO 4360	Biostatistics	
CHM 3371	Organic Chemistry I	5
CHM 3372	Organic Chemistry II	5
CHM 3373	Organic Chemistry III	5
MAT 1221	Survey of Calculus	5
or MAT 1234	Calculus I	
MAT 2360	Introduction to Statistics for the Sciences	5
Section Credits Required		40
<b>Botany Requirement <sup>1</sup></b>		
Select one of the following:		
BIO 3453	Biodiversity: Plant Identification and Taxonomy	
BIO 4415	Plant Physiology	
BIO 4744	Marine Botany	
Section Credits Required		0
<b>Field Biology Requirement <sup>1</sup></b>		
Select three credits of the following:		
BIO 3302	Coral Reef Ecology	
BIO 3303	Evolutionary Ecology in the Galapagos Islands	
BIO 3304	Oceanography of the Galapagos Archipelago	
BIO 3305	Marine Restoration Ecology	
BIO 4256	Environmental Physiology	
BIO 4744	Marine Botany	
BIO 4810	Marine Ecology	

BIO 4815	Aquatic Ecology	
BIO 4825	Forest Ecology	
BIO 4835	Conservation Biology	
Section Credits Required		0
<b>Capstone Experience</b>		
Select one of the following Groups:		3
Group A:		
BIO 4615	Bioethics	
Group B:		
BIO 4978	Biological Research Proposal	
BIO 4979	Biological Research	
Section Credits Required		3
<b>Recommended Courses</b>		
CHM 1213	General Chemistry III	
CHM 2213	Inorganic Qualitative Analysis	
MAT 1235	Calculus II	
Select one of the following Groups:		
Group A:		
PHY 1101	General Physics	
PHY 1102	General Physics	
PHY 1103	General Physics	
Group B:		
PHY 1121	Physics for Science and Engineering	
PHY 1122	Physics for Science and Engineering	
PHY 1123	Physics for Science and Engineering	
Section Credits Required		0
<b>Electives</b>		
Upper Division BIO electives <sup>2</sup>		12
<b>Total Credits</b>		<b>101</b>

1

May be met in other sections.

2

Any UD BIO courses not already used in major may count.

## Additional Requirements and Information

- Must include 5 credits with substantial lab/field component
- Max 6 credits from BIO 4900-4999 may be applied to major.

## Suggested Course Sequence

*This suggested course sequence is a potential plan for how to complete the major within four years. Please consult with a departmental faculty advisor for course advisement.*

- Students should take the Chemistry Placement test (available in Canvas) prior to New Student Advising.
  - A Chemistry Placement score  $\geq 35$  is a pre-requisite for BIO 2101 General Biology and CHM 1211 General Chemistry I
  - Students who score  $< 35$  on the Chemistry Placement test, or who would benefit from an introduction to Chemistry, should take CHM 1000 Preparation for General Chemistry in Autumn quarter, then take BIO 2101 General Biology and CHM 1211 General Chemistry I in Winter quarter.
- Students interested in careers in the health sciences should take PPHS 1200 Introduction to the Health Professions and PPHS 3400

Application Workshop. See the Pre-Professional Health Sciences program (<https://catalog.spu.edu/undergraduate/interdisciplinary-programs/pre-professional-health-sciences/>) website for more information.

## Four-Year Plan: >35 on Chemistry Placement Test

Course	Title	Credits
<b>Freshman</b>		
<b>Autumn</b>		
CHM 1211	General Chemistry I	5
UCOL 1000	University Colloquium	1
<b>Credits</b>		<b>6</b>
<b>Winter</b>		
BIO 2101	General Biology <sup>1</sup>	5
CHM 1212	General Chemistry II	5
PPHS 1200	Introduction to the Health Professions	1
<b>Credits</b>		<b>11</b>
<b>Spring</b>		
BIO 2102	General Biology	5
CHM 1213	General Chemistry III <sup>2</sup>	3
CHM 2213	Inorganic Qualitative Analysis <sup>2</sup>	2
<b>Credits</b>		<b>10</b>
<b>Any Quarter</b>		
WRI 1000	Academic Inquiry and Writing Seminar	5
WRI 1100	Disciplinary Research and Writing Seminar	5
UFDN 1000	The Christian Faith	5
<b>Credits</b>		<b>15</b>
<b>Sophomore</b>		
<b>Autumn</b>		
CHM 3371	Organic Chemistry I	5
BIO 2103	General Biology	5
<b>Credits</b>		<b>10</b>
<b>Winter</b>		
CHM 3372	Organic Chemistry II	5
<b>Credits</b>		<b>5</b>
<b>Spring</b>		
CHM 3373	Organic Chemistry III	5
<b>Credits</b>		<b>5</b>
<b>Any Quarter</b>		
MAT 2360	Introduction to Statistics for the Sciences	5
MAT 1234 or MAT 1221	Calculus I <sup>3</sup> or Survey of Calculus	5
BIO 4978 or BIO 4979	Biological Research Proposal (Begin research in years 2 - 4.) <sup>4</sup> or Biological Research	1
<b>Credits</b>		<b>11</b>
<b>Junior</b>		
<b>Autumn</b>		
PHY 1101 or PHY 1121	General Physics or Physics for Science and Engineering	5
<b>Credits</b>		<b>5</b>
<b>Autumn or Winter</b>		
BIO 3325	Genetics	5
<b>Credits</b>		<b>5</b>
<b>Winter</b>		
PHY 1102 or PHY 1122	General Physics or Physics for Science and Engineering	5
<b>Credits</b>		<b>5</b>

<b>Spring</b>		
PHY 1103 or PHY 1123	General Physics or Physics for Science and Engineering	5
Apply to graduate!		
<b>Credits</b>		<b>5</b>
<b>Any Quarter</b>		
BIO 3899	Scientific Literature	1
Select five credits of ecology from the following:		
BIO 3302	Coral Reef Ecology	5
BIO 3303	Evolutionary Ecology in the Galapagos Islands	
BIO 3305	Marine Restoration Ecology	
BIO 3310	Ecology	
BIO 4810	Marine Ecology	
BIO 4815	Aquatic Ecology	
BIO 4825	Forest Ecology	
BIO 4835	Conservation Biology	
BIO 4840	Chemical Ecology	
Select five credits of taxonomy/diversity from the following:		
BIO 3000	Introduction to Biological Anthropology	5
BIO 3432	Biodiversity: Vertebrate Biology	
BIO 3453	Biodiversity: Plant Identification and Taxonomy	
BIO 4320	Principles of Development	
BIO 4744	Marine Botany	
Select five credits of Botany from the following (may be met in other sections):		
BIO 3453	Biodiversity: Plant Identification and Taxonomy	5
BIO 4415	Plant Physiology	
BIO 4744	Marine Botany	
Select three credits of Field Bio in years 3 - 4 (see catalog for options).		
<b>Credits</b>		<b>19</b>
<b>Senior</b>		
<b>Autumn</b>		
BIO 4615	Bioethics <sup>4</sup>	3
PPHS 3400	Application Workshop	2
<b>Credits</b>		<b>5</b>
<b>Winter</b>		
BIO 4330	Evolutionary Mechanisms	5
<b>Credits</b>		<b>5</b>
<b>Spring</b>		
BIO 4352	Cell Biology	5
<b>Credits</b>		<b>5</b>
<b>Any Quarter</b>		
Select 12 credits upper division BIO courses in years 3-4 not used elsewhere in major.		
Select five credits of Physiology core from the following:		
BIO 4256	Environmental Physiology	5
BIO 4410	Human Physiology	
BIO 4413	Animal Physiology	
BIO 4415	Plant Physiology	
BIO 4418	Neurobiology	
BIO 4419	Medical Virology	
<b>Credits</b>		<b>17</b>
<b>Total Credits</b>		<b>144</b>

1

Students who test at Math Placement Level B and who either score  $\geq 45$  on the Chemistry Placement Test or transfer in the complete General Chemistry sequence may take BIO 2103 General Biology in Autumn 2024.

2

May take CHM 3225 Quantitative Analysis and Equilibrium or BIO 4360 Biostatistics instead of CHM 1213 General Chemistry III/CHM 2213 Inorganic Qualitative Analysis - consult with your faculty advisor for the best option.

3

Take Calculus Placement Test in Canvas first. MAT 1235 Calculus II may be required by some graduate programs.

4

Students have the option of conducting research (BIO 4978 Biological Research Proposal and BIO 4979 Biological Research) or taking BIO 4615 Bioethics to complete their Capstone Experience.

## Freshman Notes

- Take Math Placement Test (in Canvas) if you are at Math Level 0 or A at time of admission.
- Math Level B is a prerequisite for BIO 2102 General Biology, BIO 2103 General Biology, CHM 1212 General Chemistry II and MAT 2360 Introduction to Statistics for the Sciences.
- Students who test into Level 0 or A should plan to take MAT 0144 College Readiness Math I and/or MAT 0145 College Readiness Math II to achieve Math Level B.

## Sophomore Notes

- MAT 2360 Introduction to Statistics for the Sciences is a pre-requisite for BIO 3325 Genetics and BIO 4360 Biostatistics.

## Junior Notes

- BIO 3325 Genetics is offered both Autumn and Winter. It is a pre-requisite for BIO 4330 Evolutionary Mechanisms (Winter only) and BIO 4352 Cell Biology (Spring only).
- Check the time schedule, as most upper division courses are offered only in certain quarters.
- Physics 110x or 112x series is recommended for most graduate programs.

## Four-Year Plan: <35 on Chemistry Placement Test

Course	Title	Credits
<b>Freshman</b>		
<b>Autumn</b>		
CHM 1000	Preparation for General Chemistry	2
UCOL 1000	University Colloquium	1
<b>Credits</b>		<b>3</b>
<b>Winter</b>		
BIO 2101	General Biology	5
CHM 1211	General Chemistry I	5
PPHS 1200	Introduction to the Health Professions	1
<b>Credits</b>		<b>11</b>
<b>Spring</b>		
BIO 2102	General Biology	5
CHM 1212	General Chemistry II	5
<b>Credits</b>		<b>10</b>
<b>Any Quarter</b>		
WRI 1000	Academic Inquiry and Writing Seminar	5
WRI 1100	Disciplinary Research and Writing Seminar	5
UFDN 1000	The Christian Faith	5
<b>Credits</b>		<b>15</b>

**Sophomore****Autumn**

BIO 2103	General Biology	5
PHY 1101 or PHY 1121	General Physics or Physics for Science and Engineering	5
<b>Credits</b>		<b>10</b>

**Winter**

PHY 1102 or PHY 1122	General Physics or Physics for Science and Engineering	5
<b>Credits</b>		<b>5</b>

**Spring**

CHM 1213	General Chemistry III <sup>1</sup>	3
CHM 2213	Inorganic Qualitative Analysis <sup>1</sup>	2
PHY 1103 or PHY 1123	General Physics or Physics for Science and Engineering	5
<b>Credits</b>		<b>10</b>

**Any Quarter**

MAT 2360	Introduction to Statistics for the Sciences	5
MAT 1234 or MAT 1221	Calculus I <sup>2</sup> or Survey of Calculus	5
BIO 4978 or BIO 4979	Biological Research Proposal <sup>3</sup> or Biological Research	1
<b>Credits</b>		<b>11</b>

**Junior****Autumn**

CHM 3371	Organic Chemistry I	5
<b>Credits</b>		<b>5</b>

**Autumn or Winter**

BIO 3325	Genetics	5
<b>Credits</b>		<b>5</b>

**Winter**

CHM 3372	Organic Chemistry II	5
<b>Credits</b>		<b>5</b>

**Spring**

CHM 3373	Organic Chemistry III	5
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Apply to graduate!

<b>Credits</b>		<b>5</b>
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**Any Quarter**

BIO 3899	Scientific Literature	1
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Select 5 credits of ecology from the following:

BIO 3302	Coral Reef Ecology	
BIO 3303	Evolutionary Ecology in the Galapagos Islands	
BIO 3305	Marine Restoration Ecology	
BIO 3310	Ecology	
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Select five credits of taxonomy/diversity from the following:

BIO 3000	Introduction to Biological Anthropology	
BIO 3432	Biodiversity: Vertebrate Biology	
BIO 3453	Biodiversity: Plant Identification and Taxonomy	
BIO 4320	Principles of Development	
BIO 4744	Marine Botany	

Select five credits of Botany from the following (may be met in other sections):

BIO 3453	Biodiversity: Plant Identification and Taxonomy	
BIO 4415	Plant Physiology	
BIO 4744	Marine Botany	

Select three credits of Field Bio in years 3-4 (see catalog for options).

<b>Credits</b>		<b>19</b>
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**Senior****Autumn**

BIO 4615	Bioethics <sup>3</sup>	3
PPHS 3400	Application Workshop	2
<b>Credits</b>		<b>5</b>

**Winter**

BIO 4330	Evolutionary Mechanisms	5
<b>Credits</b>		<b>5</b>

**Spring**

BIO 4352	Cell Biology	5
<b>Credits</b>		<b>5</b>

**Any Quarter**

Select five credits of Physiology core from the following:

BIO 4256	Environmental Physiology	
BIO 4410	Human Physiology	
BIO 4413	Animal Physiology	
BIO 4415	Plant Physiology	
BIO 4418	Neurobiology	
BIO 4419	Medical Virology	

Select 12 credits upper division BIO courses in years 3-4 not used elsewhere in major.

<b>Credits</b>		<b>17</b>
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**Total Credits** 146

1

May take CHM 3225 Quantitative Analysis and Equilibrium or BIO 4360 Biostatistics instead of CHM 1213 General Chemistry III/CHM 2213 Inorganic Qualitative Analysis - consult with your faculty advisor for best option.

2

Take Calculus Placement Test in Canvas first. MAT 1235 Calculus II may be required by some graduate programs.

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**Freshman Notes**

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  - Math Level B is a prerequisite for BIO 2102 General Biology, BIO 2103 General Biology, CHM 1212 General Chemistry II and MAT 2360 Introduction to Statistics for the Sciences.
- Students who test into Level 0 or A should plan to take MAT 0144 College Readiness Math I and/or MAT 0145 College Readiness Math II to achieve Math Level B.
- BIO 2102 General Biology and BIO 2103 General Biology can be taken in either order.

**Sophomore Notes**

- MAT 2360 Introduction to Statistics for the Sciences is a pre-requisite for BIO 3325 Genetics and BIO 4360 Biostatistics.
- Physics (either 110x or 112x series) is recommended for most graduate programs.

**Junior Notes**

- BIO 3325 Genetics is offered both Autumn and Winter. It is a pre-requisite for BIO 4330 Evolutionary Mechanisms (Winter only) and BIO 4352 Cell Biology (Spring only).

- Check the time schedule, as most upper division courses are offered only in certain quarters.