

# BIOCHEMISTRY (BS)

## Program Description

This degree prepares you for graduate study in biochemistry, molecular biology, and careers in research science. This degree program also prepares you for professional health care programs and careers, especially when combined with the pre-professional health sciences (PPHS) courses.

## 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/l/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/l/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.

## Biochemistry (BS)

89 Credits Minimum, Including 50 Upper Division (UD)

Code	Title	Credits
<b>Required Chemistry and Biology Courses</b>		
BIO 2101	General Biology	5
BIO 3325	Genetics	5
BIO 4325	Molecular Biology	5
CHM 1211	General Chemistry I	5
CHM 1212	General Chemistry II	5
CHM 1213	General Chemistry III	3
CHM 2960	Introduction to Research Methods	1
CHM 3371	Organic Chemistry I	5
CHM 3372	Organic Chemistry II	5
CHM 3373	Organic Chemistry III	5
CHM 3225	Quantitative Analysis and Equilibrium	5

CHM 3422	Statistical Thermodynamics	4
CHM 4361	Biochemistry	5
CHM 4362	Biochemistry	5
CHM 4363	Biochemistry	3
CHM 4898	Chemistry and Biochemistry Capstone Seminar	3
Section Credits Required		69
<b>Required Mathematics and Physics Courses</b>		
MAT 1234	Calculus I	5
MAT 1235	Calculus II	5
Select one of the following Groups:		10
Group A:		
PHY 1121	Physics for Science and Engineering	
PHY 1122	Physics for Science and Engineering	
Group B:		
PHY 1101	General Physics	
PHY 1102	General Physics	
Section Credits Required		20
<b>Total Credits</b>		<b>89</b>

## Suggested Course Sequence For Freshmen who are placed into CHM 1211 General Chemistry I Autumn Quarter

This suggested course sequence also includes Preprofessional Health Sciences (PPHS coursework as an option).

Course	Title	Credits
<b>Freshman</b>		
<b>Autumn</b>		
CHM 1211 & 1211L	General Chemistry I and General Chemistry I Lab	5
BIO 2101	General Biology <sup>1</sup>	5
Ask PPHS Director to add you to events mailing list		
<b>Credits</b>		<b>10</b>
<b>Winter</b>		
CHM 1212 & 1212L	General Chemistry II and General Chemistry II Lab	5
MAT 1234	Calculus I	5
PPHS 1200	Introduction to the Health Professions (if desired)	
<b>Credits</b>		<b>10</b>
<b>Spring</b>		
CHM 1213	General Chemistry III <sup>2</sup>	3
MAT 1235	Calculus II	5
CHM 2960	Introduction to Research Methods	1
<b>Credits</b>		<b>9</b>
<b>Summer</b>		
Consider doing research/internship during summers (On-campus or REU) to prepare for graduate school. <sup>3</sup>		
PPHS students should consider shadowing and volunteering in professional health <sup>4</sup>		
<b>Credits</b>		<b>0</b>
<b>Sophomore</b>		
<b>Autumn</b>		
CHM 3371 & 3371L	Organic Chemistry I and Organic Chemistry I Lab	5
PHY 1121 or PHY 1101	Physics for Science and Engineering or General Physics	5
<b>Credits</b>		<b>10</b>

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<b>Winter</b>		
CHM 3372 & 3372L	Organic Chemistry II and Organic Chemistry II Lab	5
PHY 1122 or PHY 1102	Physics for Science and Engineering or General Physics	5
<b>Credits</b>		<b>10</b>
<b>Spring</b>		
CHM 3373 & 3373L	Organic Chemistry III and Organic Chemistry III Lab	5
<b>Credits</b>		<b>5</b>
<b>Junior</b>		
<b>Autumn</b>		
CHM 4361 & 4361L	Biochemistry and Biochemistry Lab	5
CHM 3225 & 3225L	Quantitative Analysis and Equilibrium and Quantitative Analysis and Equilibrium Lab <sup>5</sup>	5
PPHS 3400	Application Workshop	
<b>Credits</b>		<b>10</b>
<b>Winter</b>		
CHM 4362 & 4362L	Biochemistry and Biochemistry Lab	5
<b>Credits</b>		<b>5</b>
<b>Spring</b>		
CHM 4363	Biochemistry	3
CHM 3422	Statistical Thermodynamics	4
<b>Credits</b>		<b>7</b>
<b>Senior</b>		
<b>Autumn</b>		
BIO 3325	Genetics <sup>5</sup>	5
<b>Credits</b>		<b>5</b>
<b>Winter</b>		
CHM 4898	Chemistry and Biochemistry Capstone Seminar	3
BIO 4325	Molecular Biology	5
<b>Credits</b>		<b>8</b>
<b>Total Credits</b>		<b>89</b>

1

Take the Math Placement Exam before Fall freshman year. Take the calculus placement exam, too. If Pre-Calculus MAT 1110 Precalculus is indicated by the placement, stay on sequence with your math by taking the math courses you are placed in as early as possible. Finish the 5-credit MAT courses in the first year or soon thereafter.

2

CHM 1213 General Chemistry III can be taken in later years because it is not a pre-req for any other class that is required for the B.S. Biochem degree.

3

Majors should do CHM 4960 Undergraduate Research in Chemistry/ Biochemistry Undergraduate Research during the academic year and/or do research during the Summer.

4

The details shown below apply only to biochem majors who are also in the PPHS program. Also, remember that PPHS is a program, not a major. If you're intending to major in biochemistry and do

5

The quarters you take CHM 3225 Quantitative Analysis and Equilibrium and BIO 3325 Genetics may be switched.

### Recommendations

1. Take math as early as possible. Finish the 5-credit MAT courses in the first year or soon after. Historically, Genetics profs accepted

students with calculus experience instead of MAT 2360 Introduction to Statistics for the Sciences. Ask the genetics professor to waive the MAT 2360 pre-req.

- a. Because this rule makes the first year crowded, you may need to make room. If so, you may postpone BIO 2103 General Biology (there is room to take it in later spring quarters).
2. For a number of reasons, the 2-credit lab CHM 2213 Inorganic Qualitative Analysis is not required for biochemists. Of course, the 3-credit lecture CHM 1213 General Chemistry III is, but it can sometimes be postponed.
  3. For pre-meds, we recommend more bio beyond the BIO 210X series in the form of A&P specifically. There is a 5-credit Fall course, BIO 4410 Human Physiology, that is recommended (the alternative is taking two 5-credit courses which can be difficult to schedule).
  4. For PPHS biochemistry majors, BIO 2102 General Biology can be taken Spring Sophomore year while BIO 2103 General Biology can be taken even later (Spring Junior year). The main thing to remember is that you have a few years to complete all these courses. BIO 2101 and CHM 1212 are essential pre-req's for other courses so these have to be taken early, but BIO2102 and BIO 2103 may be postponed.
  5. In general, PPHS requires a year of bio, a year of general chem (not taking CHM 2213 Inorganic Qualitative Analysis is OK!), a year of organic, some biochem, and a few more bio courses.

### For Freshmen who will take CHM 1211 General Chemistry I Winter Quarter

This suggested course sequence also includes Preprofessional Health Sciences (PPHS) coursework as an option.

Course	Title	Credits
<b>Freshman</b>		
<b>Autumn</b>		
CHM 1000	Preparation for General Chemistry	2
BIO 2101	General Biology <sup>1</sup>	5
Ask PPHS Director to add you to events mailing list		
<b>Credits</b>		<b>7</b>
<b>Winter</b>		
CHM 1211 & 1211L	General Chemistry I and General Chemistry I Lab	5
MAT 1234	Calculus I	5
PPHS 1200	Introduction to the Health Professions (if desired)	
<b>Credits</b>		<b>10</b>
<b>Spring</b>		
CHM 1212 & 1212L	General Chemistry II and General Chemistry II Lab	5
MAT 1235	Calculus II	5
CHM 2960	Introduction to Research Methods	1
<b>Credits</b>		<b>11</b>
<b>Summer</b>		
Consider doing research/internship during summers (on-camps or REU) to prepare for graduate school. <sup>2</sup>		
PPHS students should consider shadowing and volunteering in professional health field. <sup>3</sup>		
<b>Credits</b>		<b>0</b>
<b>Sophomore</b>		
<b>Autumn</b>		
CHM 3371 & 3371L	Organic Chemistry I and Organic Chemistry I Lab	5
PHY 1121 or PHY 1101	Physics for Science and Engineering or General Physics	5
<b>Credits</b>		<b>10</b>

<b>Winter</b>		
CHM 3372 & 3372L	Organic Chemistry II and Organic Chemistry II Lab	5
PHY 1122 or PHY 1102	Physics for Science and Engineering or General Physics	5
<b>Credits</b>		<b>10</b>
<b>Spring</b>		
CHM 1213	General Chemistry III <sup>4</sup>	3
CHM 3373 & 3373L	Organic Chemistry III and Organic Chemistry III Lab	5
<b>Credits</b>		<b>8</b>
<b>Junior</b>		
<b>Autumn</b>		
CHM 4361 & 4361L	Biochemistry and Biochemistry Lab	5
CHM 3225 & 3225L	Quantitative Analysis and Equilibrium and Quantitative Analysis and Equilibrium Lab <sup>5</sup>	5
PPHS 3400	Application Workshop	
<b>Credits</b>		<b>10</b>
<b>Winter</b>		
CHM 4362 & 4362L	Biochemistry and Biochemistry Lab	5
<b>Credits</b>		<b>5</b>
<b>Spring</b>		
CHM 4363	Biochemistry	3
CHM 3422	Statistical Thermodynamics	4
<b>Credits</b>		<b>7</b>
<b>Senior</b>		
<b>Autumn</b>		
BIO 3325	Genetics <sup>5</sup>	5
<b>Credits</b>		<b>5</b>
<b>Winter</b>		
CHM 4898	Chemistry and Biochemistry Capstone Seminar	3
BIO 4325	Molecular Biology	5
<b>Credits</b>		<b>8</b>
<b>Total Credits</b>		<b>91</b>

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## Recommendations

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to Statistics for the Sciences. Ask the genetics professor to waive the MAT 2360 pre-req.

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2. For a number of reasons, the 2-credit lab CHM 2213 Inorganic Qualitative Analysis is not required for biochemists. Of course, the 3-credit lecture CHM 1213 is, but it can be postponed.
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