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)

93 Credits Minimum, Including 50 Upper Division (UD)

Code	Title	Credits
Required Chemistry and Biology Courses		
BIO 2202	General Biology II	5
BIO 3325	Genetics	5
CHM 1211	General Chemistry I	5
CHM 1212	General Chemistry II	5
CHM 1213	General Chemistry III	3
CHM 1999	Chem & Biochem Research & Writing	5
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		68
Requred Mathematics and Physics Courses		
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
Electives (required to choose at least 5 credits from the list shown below)		**5**
CHM 3226	Quantitative and Instrumental Analysis	
CHM 4960	Undergraduate Research in Chemistry/ Biochemistry	
BIO 4352	Cell Biology	
BIO 4418	Neurobiology	
BIO 4840	Chemical Ecology	
BIO 4419	Medical Virology	
Total Credits		**93**

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
Freshman		
Autumn		
CHM 1211 & 1211L	General Chemistry I and General Chemistry I Lab	5
MAT 1234	Calculus I	5
Ask PPHS Director to add you to events mailing list		
	Credits	**10**
Winter		
CHM 1212 & 1212L	General Chemistry II and General Chemistry II Lab	5
BIO 2202	General Biology II	5
MAT 1235	Calculus II	5
PPHS 1200	Introduction to the Health Professions (if desired)	
	Credits	**15**
Spring		
CHM 1213	General Chemistry III [2]	3
CHM 1999	Chem & Biochem Research & Writing	5
	Credits	**8**
Summer		
Consider doing research/internship during summers (On-campus or REU) to prepare for graduate school. [3]		

PPHS students should consider shadowing and volunteering in professional health [5]		
	Credits	**0**
Sophomore		
Autumn		
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
	Credits	**10**
Winter		
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
	Credits	**10**
Spring		
CHM 3373 & 3373L	Organic Chemistry III and Organic Chemistry III Lab	5
	Credits	**5**
Junior		
Autumn		
CHM 4361 & 4361L	Biochemistry and Biochemistry Lab	5
CHM 3225 & 3225L	Quantitative Analysis and Equilibrium and Quantitative Analysis and Equilibrium Lab [4]	5
PPHS 3400	Application Workshop	
	Credits	**10**
Winter		
CHM 4362 & 4362L	Biochemistry and Biochemistry Lab	5
	Credits	**5**
Spring		
CHM 4363	Biochemistry	3
CHM 3422	Statistical Thermodynamics	4
	Credits	**7**
Senior		
Autumn		
BIO 3325	Genetics [4]	5
	Credits	**5**
Winter		
CHM 4898	Chemistry and Biochemistry Capstone Seminar	3
	Credits	**3**
Any Quarter		
Complete 5 credits of UD required electives from short list of options		5
	Credits	**5**
	Total Credits	**93**

1. Take the Math Placement Exam before Fall freshman year. Take the calculus placement exam, too. If Pre-Calculus MAT 1141 Precalculus I 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 years you take CHM 3225 Quantitative Analysis and Equilibrium and BIO 3325 Genetics may be switched, but it can be helpful to complete CHM 3225 before CHM 4361.
5. 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 PPHS, the advice you follow from your chemistry major advisor will from time to time will be slightly different than the advice a biology major (or BS chem major for that matter) will follow. Therefore, PPHS biochemists will take a slightly different path than is suggested to PPHS biologists, based on the following recommendations:

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 2203 General Biology III (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 2201 General Biology I can be taken Autumn Sophomore year while BIO 2203 General Biology III 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 2202 and CHM 1212 are essential pre-req's for other courses so these have to be taken early, but BIO2201 and BIO 2203 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
Freshman		
Autumn		
CHM 1000	Preparation for General Chemistry	2
MAT 1234	Calculus I	5
Ask PPHS Director to add you to events mailing list		
	Credits	**7**
Winter		
CHM 1211 & 1211L	General Chemistry I and General Chemistry I Lab	5
BIO 2202	General Biology II	5
MAT 1235	Calculus II	5
PPHS 1200	Introduction to the Health Professions (if desired)	
	Credits	**15**
Spring		
CHM 1212 & 1212L	General Chemistry II and General Chemistry II Lab	5
CHM 1999	Chem & Biochem Research & Writing	5
	Credits	**10**

Summer		
Consider doing research/internship during summers (on-camps or REU) to prepare for graduate school. [2]		
PPHS students should consider shadowing and volunteering in professional health field. [5]		
	Credits	**0**
Sophomore		
Autumn		
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
	Credits	**10**
Winter		
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
	Credits	**10**
Spring		
CHM 1213	General Chemistry III [3]	3
CHM 3373 & 3373L	Organic Chemistry III and Organic Chemistry III Lab	5
	Credits	**8**
Junior		
Autumn		
CHM 4361 & 4361L	Biochemistry and Biochemistry Lab	5
CHM 3225 & 3225L	Quantitative Analysis and Equilibrium and Quantitative Analysis and Equilibrium Lab [4]	5
PPHS 3400	Application Workshop	
	Credits	**10**
Winter		
CHM 4362 & 4362L	Biochemistry and Biochemistry Lab	5
	Credits	**5**
Spring		
CHM 4363	Biochemistry	3
CHM 3422	Statistical Thermodynamics	4
	Credits	**7**
Senior		
Autumn		
BIO 3325	Genetics [4]	5
	Credits	**5**
Winter		
CHM 4898	Chemistry and Biochemistry Capstone Seminar	3
	Credits	**3**
Any Quarter		
Complete 5 credits of UD required electives from short list of options		5
	Credits	**5**
	Total Credits	**95**

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2. Majors should do CHM 4960 Undergraduate Research in Chemistry/Biochemistry Undergraduate Research during the academic year and/or do research during Summer.
3. 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.
4. The years you take CHM 3225 Quantitative Analysis and Equilibrium and BIO 3325 Genetics may be switched, but it can be helpful to complete CHM 3225 before taking CHM 4361.
5. 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 PPHS, the advice you follow from your chemistry major advisor will from time to time will be slightly different than the advice a biology major (or BS chem major for that matter) will follow. Therefore, PPHS biochemists will take a slightly different path than is suggested to PPHS biologists, based on the following recommendations:

Recommendations

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   a. Because this rule makes the first year crowded, you may need to make room. If so, you may postpone BIO 2203 General Biology III (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 is, but it can 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 2 5-credit
4. For PPHS biochemistry majors, BIO 2201 General Biology I can be take Spring Sophomore year while BIO 2203 General Biology III can be taken even later (Spring Junior year). The main thing to remember is that you have a few years to complete all of these courses, so keep them on your radar.
5. In general, PPHS requires a year of bio, a year of general chem (no CHM 2213 Inorganic Qualitative Analysis is OK!), a year of organic, some biochem, and a few more bio courses.