

# BIOCHEMISTRY, B.S.

Saint Louis University's Bachelor of Science in Biochemistry is designed for students interested in the applications of chemistry to the life sciences. The program prepares students for professional schools such as medicine, dentistry, law and pharmacy. The program provides excellent preparation for students interested in working in biochemistry, molecular biology or biotechnology.

The chemistry department at Saint Louis University places great emphasis on participation in undergraduate research, and majors have ample opportunities to involve themselves in research projects under the close mentorship of a full-time faculty member. Students have the opportunity to use a variety of specialized equipment and computers in their instructional and research laboratories.

The department hosts several social events each year and sponsors a chemistry club for interested students.

Other highlights include:

- A rigorous program that makes graduates competitive for employment in STEM areas.
- Opportunities for students to strengthen their scientific communication skills through research activities that pair an undergraduate with a faculty researcher.
- A unique mentoring program that continues from freshman to senior year, providing guidance and support for students in reaching their professional goals.

## Curriculum Overview

- **First year:** General Chemistry 1 and 2, Calculus I and II, Principles of Biology I and II
- **Second year:** Organic Chemistry 1 and 2, Analytical Chemistry 1 Engineering Physics I and II
- **Third year:** Biochemistry 1 and 2, Chemistry Literature, Inorganic Chemistry, Physical Chemistry 1 and 2, Physical Chemistry Lab, undergraduate research
- **Fourth year:** Principles of Genetics, undergraduate research, one chemistry elective, senior residency

## Fieldwork and Research Opportunities

Selected undergraduate students may have opportunities to work with faculty members as laboratory assistants in undergraduate laboratories and receive a stipend.

Benefits of SLU's biochemistry program also include many internship and career opportunities. Undergraduates who study chemistry at SLU can attend professional meetings and present their research results. In recent years, SLU students have presented numerous talks and poster presentations at regional and national meetings of the American Chemical Society and other scientific conferences.

## Careers

Career options in biochemistry include:

- Teaching at the university, college or high school level
- Chemical research and development in industry or government laboratories
- Pharmaceutical research

- Drug discovery and drug development
- Biotechnology
- Environmental research
- Management and administration in the chemical industry
- Chemical and pharmaceutical sales
- Patent law and environmental law
- Opportunities in the public health sector

A bachelor of science degree in biochemistry is good preparation for students who want to continue their education in graduate school studying chemistry, biochemistry and health-related areas such as pharmacology and toxicology, as well as in professional school studying medicine, law, pharmacy or dentistry.

## Admission Requirements

### Freshman

All applications are thoroughly reviewed with the highest degree of individual care and consideration to all credentials that are submitted. Solid academic performance in college preparatory course work is a primary concern in reviewing a freshman applicant's file. College admission test scores (ACT or SAT) are used as an additional indicator of the student's ability to meet the academic rigors of Saint Louis University and are used as qualifiers for certain University scholarship programs. To be considered for admission to any Saint Louis University undergraduate program, the applicant must be graduating from an accredited high school or have an acceptable score on the General Education Development (GED) test.

### Transfer

Applicants must be a graduate of an accredited high school or have an acceptable score on the GED. An official high school transcript and official test scores are required only of those students who have attempted fewer than 24 transferable semester credits (or 30 quarter credits) of college credit. Those having completed 24 or more of college credit need only submit a transcript from previously attended college(s). In reviewing a transfer applicant's file, the office of admission holistically examines the student's academic performance in college-level coursework as an indicator of the student's ability to meet the academic rigors of Saint Louis University.

### International Applicants

All admission policies and requirements for domestic students apply to international students along with the following:

- Demonstrate English Language Proficiency (<http://catalog.slu.edu/academic-policies/office-admission/undergraduate/english-language-proficiency>)
- Proof of financial support must include:
  - A letter of financial support from the person(s) or sponsoring agency funding the time at Saint Louis University
  - A letter from the sponsor's bank verifying that the funds are available and will be so for the duration of study at the University
- Academic records, in English translation, of students who have undertaken postsecondary studies outside the United States must include the courses taken and/or lectures attended, practical laboratory work, the maximum and minimum grades attainable, the grades earned or the results of all end-of-term examinations, and any honors or degrees received. WES and ECE transcripts are accepted.

## Scholarships and Financial Aid

There are two principal ways to help finance a Saint Louis University education:

- Scholarships: awarded based on academic achievement, service, leadership and financial need.
- Financial Aid: provided in the form of grants and loans, some of which require repayment.

For priority consideration for merit-based scholarships, applicants should apply for admission by Dec. 1 and complete a Free Application for Federal Student Aid (FAFSA) by March 1.

For information on other scholarships and financial aid, visit the student financial services office online at <http://finaid.slu.edu>.

## Accreditation

The Bachelor of Science in Biochemistry has been continuously certified by the American Chemical Society since 2004.

## Learning Outcomes

1. Graduates will be able to demonstrate a foundational understanding of organic, inorganic, analytical and physical chemistry, and advanced knowledge in biochemistry.
2. Graduates will be able to demonstrate proficiency of basic (general, organic, analytical and physical) and advanced biochemistry laboratory techniques and conduct laboratory experiments safely.
3. Graduates will be able to collect, interpret and analyze quantitative data.
4. Graduates will be able to communicate scientific results effectively, especially through written reports and oral presentations.
5. Graduates will be able to design and conduct independent research.

## Requirements

Code	Title	Credits
<b>Core Requirement</b>		
College core requirements (p. 3)		54-63
For additional information about core courses ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/#coretext">http://catalog.slu.edu/colleges-schools/arts-sciences/#coretext</a> )		
<b>Required Courses</b>		
BIOL 1240	Principles of Biology I	3
BIOL 1245	Principles of Biology I Laboratory	1
BIOL 1260	Principles of Biology II	3
BIOL 1265	Principles of Biology II Laboratory	1
BIOL 3030	Principles of Genetics	3
CHEM 1130	General Chemistry 1 for Majors	3
CHEM 1115	General Chemistry 1 Laboratory	1
CHEM 1140	General Chemistry 2 for Majors	3
CHEM 1125	General Chemistry 2 Laboratory	1
CHEM 2200	Analytical Chemistry 1	2
CHEM 2205	Analytical Chemistry 1 Laboratory	2
CHEM 2430	Organic Chemistry 1 for Majors	3
CHEM 2440	Organic Chemistry 2 for Majors	3
CHEM 2435	Organic Chemistry 1 Lab for Majors	1
CHEM 2445	Organic Chemistry 2 Laboratory for Majors	1

CHEM 3100	The Chemical Literature	1
CHEM 3970	Undergraduate Research <sup>1</sup>	3
CHEM 3330	Physical Chemistry 1	3
CHEM 3340	Physical Chemistry 2	3
CHEM 3345	Physical Chemistry Laboratory	1
CHEM 4500	Inorganic Chemistry	3
CHEM 4610	Biochemistry 1	3
CHEM 4615	Biochemistry 1 Laboratory	1
CHEM 4620	Biochemistry 2	3
CHEM 4625	Biochemistry 2 Laboratory	1
MATH 1510	Calculus I	4
MATH 1520	Calculus II	4
PHYS 1610	Engineering Physics I <sup>2</sup>	3
PHYS 1620	Engineering Physics I Laboratory <sup>2</sup>	1
PHYS 1630	Engineering Physics II <sup>2</sup>	3
PHYS 1640	Engineering Physics II Laboratory <sup>2</sup>	1
Total Credits		123-132

<sup>1</sup> Students take 3 semesters, 1 credit per semester

<sup>2</sup> Engineering Physics I and II with lab are recommended for majors unless they are pre-medical. Physics I and II with lab PHYS 1310 Physics I, PHYS 1320 Physics I Laboratory, PHYS 1330 Physics II, and PHYS 1340 Physics II Laboratory also fulfill the physics requirement and are recommended for pre-medical students.

- One of the following is a required elective: Mathematical Techniques in Chemistry, Analytical Chemistry 2, Environmental Chemistry, Medicinal Chemistry, Organic Spectroscopy or a 5000-level chemistry course.

## Non-Course Requirements

All undergraduate majors must complete the requirements for first-year and second-year mentoring. A student who transfers into the department and does not have opportunity to take one or both of these requirements must take transfer student mentoring to meet the mentoring requirement.

## Continuation Standards

The following standards apply to all new freshmen and transfer students:

- Students must earn C- or better in CHEM 1110 General Chemistry 1 or CHEM 1130 General Chemistry 1 for Majors) and a C- or better in CHEM 1120 General Chemistry 2 or CHEM 1140 General Chemistry 2 for Majors, or the equivalent in transfer.
- Students must earn a C- or better in CHEM 2200 Analytical Chemistry 1.

Students who do not earn a C- in any of the identified courses must retake the course at SLU in the following semester. If a C- is not earned on the second attempt the student will be dismissed from the major. A student who withdraws from one of these courses on the first attempt thus has one more attempt to earn a C-.

Students must maintain a 2.00 GPA in their major (CHEM) and required related courses (BIOL, PHYS, MATH, etc.) If a student falls below a 2.00 major GPA the student must meet with the undergraduate program director to review their academic performance. If the student cannot raise the major GPA to 2.00 in two semesters, the student will be dismissed from the major.

## Bachelor of Science Core Curriculum Requirements

Code	Title	Credits
<b>Core Components and Credits</b>		
	Foundations of Discourse ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/foundations-discourse">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/foundations-discourse</a> )	3
	Diversity in the U.S. ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/cultural-diversity">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/cultural-diversity</a> )	3
	Global Citizenship ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/global-citizenship">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/global-citizenship</a> )	3
	Foreign Language ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/foreign-language">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/foreign-language</a> )	0-9
	Fine Arts ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/fine-arts">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/fine-arts</a> )	3
	Literature ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/literature">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/literature</a> )	6
	Mathematics ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/mathematics">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/mathematics</a> )	4
	Science ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/sciences">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/sciences</a> )	8
	Philosophy ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/philosophy">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/philosophy</a> )	6
	Social Science ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/social-science">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/social-science</a> )	6
	Theology ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/theology">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/theology</a> )	6
	World History ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/world-history">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/world-history</a> )	6
Total Credits		54-63

### Graduation Requirements

- Complete a minimum of 120 credits (excluding pre-college level courses [numbered below 1000]).
- Complete either the College of Arts and Sciences Bachelor of Arts or Bachelor of Science Core Curriculum Requirements
- Complete Major Requirements: minimum 30 credits required.
- Complete remaining credits with a second major, minor, certificate, and/or elective credits to reach the minimum of 120 credits required for graduation.
- Achieve at least a 2.00 cumulative grade point average, a 2.00 grade point average in the major(s) and a 2.00 grade point average in the minor/certificate, or related elective credits.
- Complete Dept/Program specific academic and performance requirements.
- Complete at least 50% of the coursework for the major and 75% for the minor/certificate through Saint Louis University or an approved study abroad program.
- Complete 30 of the final 36 credits through Saint Louis University or an approved study abroad program.
- Complete an online degree application by the required University deadline.

## Roadmap

Course	Title	Credits
<b>Year One</b>		
<b>Fall</b>		
CHEM 1130	General Chemistry 1 for Majors	3

CHEM 1115	General Chemistry 1 Laboratory	1
MATH 1510	Calculus I	4
BIOL 1240	Principles of Biology I	3
BIOL 1245	Principles of Biology I Laboratory	1
A&S Core		3
Credits		15

### Spring

CHEM 1140	General Chemistry 2 for Majors	3
CHEM 1125	General Chemistry 2 Laboratory	1
MATH 1520	Calculus II	4
BIOL 1260	Principles of Biology II	3
BIOL 1265	Principles of Biology II Laboratory	1
A&S Core		3
Credits		15

### Year Two

#### Fall

CHEM 2430	Organic Chemistry 1 for Majors	3
CHEM 2435	Organic Chemistry 1 Lab for Majors	1
CHEM 2200	Analytical Chemistry 1	2
CHEM 2205	Analytical Chemistry 1 Laboratory	2
PHYS 1610	Engineering Physics I	3
PHYS 1620	Engineering Physics I Laboratory	1
A&S Core		3
Credits		15

#### Spring

CHEM 2440	Organic Chemistry 2 for Majors	3
CHEM 2445	Organic Chemistry 2 Laboratory for Majors	1
PHYS 1630	Engineering Physics II	3
PHYS 1640	Engineering Physics II Laboratory	1
A&S Core		3
A&S Core		3
A&S Core		3
Credits		17

### Year Three

#### Fall

CHEM 4610	Biochemistry 1	3
CHEM 4615	Biochemistry 1 Laboratory	1
CHEM 3330	Physical Chemistry 1	3
CHEM 3100	The Chemical Literature	1
A&S Core		3
A&S Core		3
A&S Core		3
Credits		17

#### Spring

CHEM 4620	Biochemistry 2	3
CHEM 4625	Biochemistry 2 Laboratory	1
CHEM 3340	Physical Chemistry 2	3
CHEM 3345	Physical Chemistry Laboratory	1
CHEM 3970	Undergraduate Research	1
A&S Core		3
A&S Core		3
Credits		15

**Year Four****Fall**

CHEM 3970	Undergraduate Research	1
BIOL 3030	Principles of Genetics	3
CHEM 4500	Inorganic Chemistry	3
A&S Core		3
A&S Core		3
Credits		13

**Spring**

Completion of Exit Interview		
Completion of Undergraduate Thesis		
CHEM 4XXX	Elective	3
CHEM 3970	Undergraduate Research	1
A&S Core		3
Elective		3
Elective		3
Credits		13
Total Credits		120

**Program Notes**

Engineering Physics (PHYS 1610 Engineering Physics I (3 cr)-PHYS 1640 Engineering Physics II Laboratory (1 cr)) is recommended. However, Physics (PHYS 1310 Physics I (3 cr)-PHYS 1340 Physics II Laboratory (1 cr)) also fulfills the physics requirement.