

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 emphasizes 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 can use a variety of specialized equipment and computers in their instructional and research laboratories.

Each year, the department hosts several social events and sponsors a chemistry club for interested students.

Program Highlights

- 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

Fieldwork and Research Opportunities

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

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

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

Begin Your Application (<https://www.slu.edu/apply.php>)

Saint Louis University also accepts the Common Application.

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 coursework is a primary concern in reviewing a freshman applicant's file.

To be considered for admission to any Saint Louis University undergraduate program, applicants must be graduating from an accredited high school, have an acceptable HiSET exam score or take 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.

Students who have attempted fewer than 24 semester credits (or 30 quarter credits) of college credit must follow the above freshmen admission requirements. Students who have completed 24 or more semester credits (or 30 quarter credits) of college credit must submit transcripts from all 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. Where applicable, transfer students will be evaluated on any courses outlined in the continuation standards of their preferred major.

International Applicants

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

- Demonstrate English Language Proficiency (<https://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.

Tuition

Tuition	Cost Per Year
Undergraduate Tuition	\$54,760

Additional charges may apply. Other resources are listed below:

Net Price Calculator (<https://www.slu.edu/financial-aid/tuition-and-costs/calculator.php>)

Information on Tuition and Fees (<https://catalog.slu.edu/academic-policies/student-financial-services/tuition/>)

Miscellaneous Fees (<https://catalog.slu.edu/academic-policies/student-financial-services/fees/>)

Information on Summer Tuition (<https://catalog.slu.edu/academic-policies/student-financial-services/tuition-summer/>)

Scholarships and Financial Aid

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

- **Scholarships:** Scholarships are awarded based on academic achievement, service, leadership and financial need.
- **Financial Aid:** Financial aid is provided through grants and loans, some of which require repayment.

Saint Louis University makes every effort to keep our education affordable. In fiscal year 2023, 99% of first-time freshmen and 92% of all students received financial aid (<https://www.slu.edu/financial-aid/>) and students received more than \$459 million in aid University-wide.

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

For information on other scholarships and financial aid, visit www.slu.edu/financial-aid (<https://www.slu.edu/financial-aid/>).

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 in 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

Biochemistry students must complete a minimum total of 72 credits for the B.S. major.

Code	Title	Credits
University Undergraduate Core (https://catalog.slu.edu/academic-policies/academic-policies-procedures/university-core/)		
Major Requirements		
BIOL 1240 & BIOL 1245	General Biology: Information Flow and Evolution and Principles of Biology I Laboratory	4
BIOL 1260 & BIOL 1265	General Biology: Transformations of Energy and Matter and Principles of Biology II Laboratory	4
CHEM 1130 & CHEM 1115	General Chemistry 1 for Majors and General Chemistry 1 Laboratory	4
CHEM 1140 & CHEM 1125	General Chemistry 2 for Majors and General Chemistry 2 Laboratory	4
CHEM 2200 & CHEM 2205	Analytical Chemistry 1 and Analytical Chemistry 1 Laboratory	4
CHEM 2430 & CHEM 2435	Organic Chemistry 1 for Majors and Organic Chemistry 1 Lab for Majors	4
CHEM 2440 & CHEM 2445	Organic Chemistry 2 for Majors and Organic Chemistry 2 Laboratory for Majors	4
CHEM 3100	The Chemical Literature	1
CHEM 3970	Undergraduate Research (Students take 1 credit for 3 semesters for a total of 3 credits)	1
CHEM 3330 & CHEM 3345	Physical Chemistry 1 and Physical Chemistry Laboratory	4
CHEM 3340	Physical Chemistry 2	3
CHEM 4500	Inorganic Chemistry	3
CHEM 4610 & CHEM 4615	Biochemistry 1 and Biochemistry 1 Laboratory	4
CHEM 4620 & CHEM 4625	Biochemistry 2 and Biochemistry 2 Laboratory	4
Additional CHEM 4000 Elective		3
<i>Required biological elective</i> ¹		3
Select 3 credits of electives from the approved list ¹		
MATH 1510	Calculus I	4
MATH 1520	Calculus II	4
PHYS 1610 & PHYS 1620	University Physics I and University Physics I Laboratory ²	4
PHYS 1630 & PHYS 1640	University Physics II and University Physics II Laboratory ²	4
General Electives		21-24
Total Credits		120

¹ BIOL 3010 Evolutionary Biology (3 cr), BIOL 3030 Principles of Genetics (3 cr), BIOL 3400X Introduction to Neuroscience 1: Cellular, Molecular and Systemic (3 cr), BIOL 4070 Advanced Biological Chemistry (3 cr), BIOL 4250 Neurobiology of Disease (3 cr), BIOL 4430 Principles of Virology (3 cr), BIOL 4460 Exercise Physiology (3 cr), BIOL 4520 Biochemical Pharmacology (3 cr), BIOL 4540 Human Systemic Physiology (3 cr), BIOL 4600 Developmental Biology (3 cr), BIOL 4630 Foundations of Immunobiology (3 cr), BIOL 4640 General Microbiology (3 cr), BIOL 4720 Cancer Biology (3 cr), BME 2200 Applied Physiology

for Engineers (3 cr), PPY 2540 Human Physiology (4 cr), PPY 4410 Molecular Pharmacology (3 cr)

² 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.

Non-Course Requirements

All Science and Engineering B.A. and B.S. students must complete an exit interview/survey near the end of their bachelor's program.

Continuation Standards

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

- Students must earn a "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.

Roadmap

Roadmaps are recommended semester-by-semester plans of study for programs and assume full-time enrollment unless otherwise noted.

Courses and milestones designated as critical (marked with !) must be completed in the semester listed to ensure a timely graduation. Transfer credit may change the roadmap.

This roadmap should not be used in the place of regular academic advising appointments. All students are encouraged to meet with their advisor/mentor each semester. Requirements, course availability and sequencing are subject to change.

Course	Title	Credits
Year One		
Fall		
CHEM 1130	General Chemistry 1 for Majors	3
CHEM 1115	General Chemistry 1 Laboratory	1
MATH 1510	Calculus I	4
BIOL 1240	General Biology: Information Flow and Evolution	3
BIOL 1245	Principles of Biology I Laboratory	1
University Core		4
Credits		16

Spring

CHEM 1140	General Chemistry 2 for Majors	3
CHEM 1125	General Chemistry 2 Laboratory	1
MATH 1520	Calculus II	4
BIOL 1260	General Biology: Transformations of Energy and Matter	3
BIOL 1265	Principles of Biology II Laboratory	1
University 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	University Physics I	3
PHYS 1620	University Physics I Laboratory	1
University Core		3
Credits		15

Spring

CHEM 2440	Organic Chemistry 2 for Majors	3
CHEM 2445	Organic Chemistry 2 Laboratory for Majors	1
PHYS 1630	University Physics II	3
PHYS 1640	University Physics II Laboratory	1
University Core		6
Credits		14

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
University Core		9
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
University Core		6
Credits		15

Year Four

Fall

CHEM 3970	Undergraduate Research	1
CHEM 4500	Inorganic Chemistry	3
Required biological elective (see program notes below)		3
University Core		4
General Elective		3
Credits		14

Spring

Completion of Exit Interview

Completion of Undergraduate Thesis

CHEM 4XXX	Elective	3
CHEM 3970	Undergraduate Research	1
General Electives		10
Credits		14
Total Credits		120

Program Notes

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

The required biological elective can be satisfied by selecting 3 credit hours of electives from the approved list: BIOL 3010 Evolutionary Biology (0,3 cr), BIOL 3030 Principles of Genetics (0,3 cr), BIOL 3400X Introduction to Neuroscience 1: Cellular, Molecular and Systemic (3 cr), BIOL 4070 Advanced Biological Chemistry (3 cr), BIOL 4250 Neurobiology of Disease (3 cr), BIOL 4430 Principles of Virology (3 cr), BIOL 4460 Exercise Physiology (3 cr), BIOL 4520 Biochemical Pharmacology (3 cr), BIOL 4540 Human Systemic Physiology (3 cr), BIOL 4600 Developmental Biology (3 cr), BIOL 4630 Foundations of Immunobiology (3 cr), BIOL 4640 General Microbiology (3 cr), BIOL 4720 Cancer Biology (3 cr), BME 2200 Applied Physiology for Engineers (3 cr), PPY 2540 Human Physiology (4 cr), PPY 4410 Molecular Pharmacology (3 cr)