CHEMICAL BIOLOGY AND PHARMACOLOGY, B.S.

Saint Louis University’s Bachelor of Science in Chemical Biology and Pharmacology is an interdisciplinary degree in which students gain a strong foundation in chemistry, biology and pharmacology. The degree is customizable to align with students’ interests in medicinal chemistry, pharmacology, or molecular biology.

Chemical biology is the application of chemistry toward solving biological problems and pharmacology is the study of the action of drug molecules. The B.S. in chemical biology and pharmacology provides excellent preparation for students seeking employment in industry (biotechnology, pharmaceutical, agriculture, etc.), as well as for those who want to continue their studies in professional school (medical, pharmacy, dental, veterinary, law, etc.) and graduate school.

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 mentoring program that runs freshman through senior year and provides guidance and support to students.

Curriculum Overview

This program places a great emphasis on undergraduate research. Students have ample opportunity to pursue research projects under the close mentorship of a full-time faculty member in the Department of Chemistry, Department of Biology and the School of Medicine’s Department of Pharmacology and Physiology. Students use a variety of specialized equipment and computers in their laboratories and in their research. Students in upper-level courses enjoy small classes and personalized attention.

• **First year:** General Chemistry I and II with labs, Principles of Biology I and II with labs, Calculus I and II
• **Second year:** Organic Chemistry I and II with labs, Analytical Chemistry I with lab, Physics I and II with labs
• **Third year:** Human Physiology, Biochemistry I and II with labs, Molecular Pharmacology, Physical Chemistry, Undergraduate Research, Chemistry Literature
• **Fourth year:** Chemical biology electives (three selected from upper-level chemistry, biology and pharmacology coursework), Undergraduate Research, Medicinal Chemistry

Fieldwork and Research Opportunities

Benefits of this program also include career opportunities. Undergraduate students work with faculty in undergraduate laboratories as laboratory assistants.

Undergraduates who study chemical biology 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 chemical biology and pharmacology include:

• Education
• Chemical research and development in industry or government laboratories
• Pharmaceutical research and drug development
• Biotechnology
• Pharmacy
• Management and administration in the pharmaceutical and biotechnology industries and health care
• Chemical, pharmaceutical, biotech and scientific instrumentation sales

This degree provides excellent preparation for medical, veterinary and pharmacy school. Other graduates continue through law school and specialize in patent law. The public health sector is also a common area to work.

Admission Requirements

Begin Your Application ([http://www.slu.edu/apply.php](http://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 rigor 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/](https://catalog.slu.edu/academic-policies/office-admission/undergraduate/english-language-proficiency/))
• Proof of financial support must include:
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 2022, 99% of first-time freshmen and 90% of all students received financial aid (https://www.slu.edu/financial-aid/) and students received more than $445 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/).

Learning Outcomes

1. Graduates will be able to explain major principles in organic chemistry, biochemistry and pharmacology.
2. Graduates will be able to conduct laboratory techniques and experiments safely.
3. Graduates will be able to analyze quantitative data.
4. Graduates will be able to apply chemistry principles to biology.
5. Graduates will be able to articulate scientific results in both oral and written forms.

Requirements

Chemical biology and pharmacology students must complete a minimum total of 78 credits for the major. Twelve hours from the math and science college core requirements are satisfied within the required major coursework.

### Code | Title | Credits
---|---|---
University Undergraduate Core (https://catalog.slu.edu/academic-policies/academic-policies-procedures/university-core/) | | 32-35

#### Major Requirements

- BIOL 1240 | General Biology: Information Flow and Evolution | 4
- & BIOL 1245 | General Principles of Biology I Laboratory | 4
- BIOL 1260 | General Biology: Transformations of Energy and Matter | 4
- & BIOL 1265 | General Principles of Biology II Laboratory | 4
- CHEB 3970 | Chemical Biology Research | 3
- or CHEM 3970 | Undergraduate Research | 3
- or BIOL 4980 | Advanced Independent Study | 3

- CHEM 1130 | General Chemistry 1 for Majors and General Chemistry 1 Laboratory | 4
- & CHEM 1115 | General Chemistry 2 for Majors and General Chemistry 2 Laboratory | 4
- CHEM 2200 | Analytical Chemistry 1 | 4
- & CHEM 2205 | Analytical Chemistry 1 Laboratory | 4
- CHEM 2430 | Organic Chemistry 1 for Majors | 4
- & CHEM 2435 | Organic Chemistry 1 Lab for Majors | 4
- CHEM 2440 | Organic Chemistry 2 for Majors | 4
- & CHEM 2445 | Organic Chemistry 2 Laboratory for Majors | 4
- CHEM 3330 | Physical Chemistry 1 | 3
- or CHEM 3340 | Physical Chemistry 2 | 3
- CHEM 3100 | The Chemical Literature | 1
- CHEM 4470 | Medicinal Chemistry | 3
- CHEM 4610 | Biochemistry 1 | 4
- & CHEM 4615 | Biochemistry 1 Laboratory | 4
- CHEM 4620 | Biochemistry 2 | 4
- & CHEM 4625 | Biochemistry 2 Laboratory | 4
- MATH 1510 | Calculus I | 4
- MATH 1520 | Calculus II | 4
- PHYS 1310 | Physics I | 4
- & PHYS 1320 | Physics I Laboratory | 4
- or PHYS 1610 | University Physics I | 4
- or PHYS 1620 | University Physics I Laboratory | 4
- PHYS 1330 | Physics II | 4
- & PHYS 1340 | Physics II Laboratory | 4
- or PHYS 1630 | University Physics II | 4
- & PHYS 1640 | University Physics II Laboratory | 4

#### Chemical Biology Electives

Nine credit hours selected from courses with the 'Chemical Biology Elective' attribute, examples include:

- ANAT 1000 | Basic Human Anatomy (Recommended for pairing with PPY 2540 or HSCI 3400. HSCI 3410 must be taken concurrently) | 4
- BIOL 3030 | Principles of Genetics | 4
- BIOL 3040 | Cell Structure & Function | 4
- BIOL 3490 | Plant Physiology | 4
- BIOL 4520 | Biochemical Pharmacology | 4
- BIOL 4630 | Foundations of Immunobiology | 4
- BIOL 4640 | General Microbiology | 4
- BIOL 4700 | Molecular Biology | 4
- BIOL 4790 | Biometry | 4
- CHEM 4200 | Analytical Chemistry 2 | 4
- CHEM 4400 | Organic Spectroscopy | 4
- CHEM 4500 | Inorganic Chemistry | 4
- CHEM 5440 | Bioorganic Chemistry | 4
- CHEM 5450 | Advanced Organic Chemistry | 4
- CHEM 5460 | Synthetic Organic Chemistry | 4
- CHEM 5620 | Biophysical Chemistry | 4
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 Analytical Chemistry 1 (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 will only have one more attempt to earn a "C-".

Students must maintain a 2.00 grade point average (GPA) in their major (CHEB or 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 program coordinator 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.
### Year Three

#### Fall

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<th>Course Title</th>
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<td>The Chemical Literature</td>
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<td>! CHEM 4610 &amp; CHEM 4615</td>
<td>Biochemistry 1 and Biochemistry 1 Laboratory</td>
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<td>Physical Chemistry 1</td>
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<td>Human Physiology</td>
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<td>PPY 4410</td>
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#### Credits

15-16

### Year Four

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#### Credits

16

#### Spring

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<td>Medicinal Chemistry</td>
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#### Credits

15-16

**Total Credits**: 120-123