

CHEMICAL BIOLOGY AND PHARMACOLOGY, B.S.

Saint Louis University's B.S. 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 towards 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 wishing to continue their studies in professional school (medical, pharmacy, dental, veterinary, law, etc.) and graduate school.

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 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. Thus, students in this major 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, Human Physiology, Analytical Chemistry I with lab, Physics I and II with labs
- Third year: Biochemistry I and II with labs, Molecular Pharmacology, Physical Chemistry, Undergraduate Research
- Fourth year: Chemical biology electives (three selected from upper-level chemistry, biology and pharmacology coursework), Undergraduate Research, Medicinal Chemistry, Chemistry Literature

Fieldwork and Research Opportunities

Benefits of this program also include internship and career opportunities. Selected undergraduate students can apply to work with faculty in undergraduate laboratories as laboratory assistants. Internships in the St. Louis area are also available.

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 will provide 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

Freshman

Begin your application for this program at www.slu.edu/apply. Saint Louis University also accepts the Common App.

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.

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

Transfer

Begin your application for this program at www.slu.edu/apply.

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

Begin your application for this program at www.slu.edu/apply.

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 <https://finaid.slu.edu>.

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 credit hours** for the major. Twelve hours from the math and science college core requirements are satisfied within the required major coursework.

Code	Title	Credits
Core Requirements		
College core requirements (p. 3)		57-66
<i>For additional information about core courses (http://catalog.slu.edu/colleges-schools/arts-sciences/#policiestext)</i>		
Required Courses		
BIOL 1240 & BIOL 1245	Principles of Biology I and Principles of Biology I Laboratory	4
BIOL 1260 & BIOL 1265	Principles of Biology II and Principles of Biology II Laboratory	4
CHEB 3970	Undergraduate Research [†]	3
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 3330 or CHEM 3340	Physical Chemistry 1 Physical Chemistry 2	3
CHEM 3100	The Chemical Literature	1
CHEM 4470	Medicinal Chemistry	3
CHEM 4610 & CHEM 4615	Biochemistry 1 and Biochemistry 1 Laboratory	4
CHEM 4620 & CHEM 4625	Biochemistry 2 and Biochemistry 2 Laboratory	4
MATH 1510	Calculus I	4
MATH 1520	Calculus II	4
PHYS 1310 & PHYS 1320 or PHYS 1610 & PHYS 1620	Physics I and Physics I Laboratory Engineering Physics I and Engineering Physics I Laboratory	4
PHYS 1330 & PHYS 1340 or PHYS 1630 & PHYS 1640	Physics II and Physics II Laboratory Engineering Physics II and Engineering Physics II Laboratory	4
PPY 2540	Human Physiology	4
PPY 4410	Molecular Pharmacology	3
Chemical Biology Electives		9
Nine credit hours selected from courses with the 'Chemical Biology Elective' attribute.		
Total Credits		135-144

[†] Students take 3 semesters, 1 credit per semester

Non-Course Requirements

All undergraduate majors must complete an exit interview with the department chair during their final semester.

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 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.

Bachelor of Science Core Curriculum Requirements

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

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		
! BIOL 1240 & BIOL 1245	Principles of Biology I and Principles of Biology I Laboratory	4
! CHEM 1130 & CHEM 1115	General Chemistry 1 for Majors and General Chemistry 1 Laboratory	4
MATH 1510	Calculus I	4
A&S Core		3
Credits		15
Spring		
! BIOL 1260 & BIOL 1265	Principles of Biology II and Principles of Biology II Laboratory	4
! CHEM 1140 & CHEM 1125	General Chemistry 2 for Majors and General Chemistry 2 Laboratory	4
!MATH 1520	Calculus II	4
A&S Core		3
Credits		15
Year Two		
Fall		
! CHEM 2430 & CHEM 2435	Organic Chemistry 1 for Majors and Organic Chemistry 1 Lab for Majors	4
PHYS 1310 & PHYS 1320	Physics I and Physics I Laboratory	4
!PPY 2540	Human Physiology (! Could be taken in the summer between Year 2 and Year 3)	4
A&S Core		3
Credits		15
Spring		
! CHEM 2440 & CHEM 2445	Organic Chemistry 2 for Majors and Organic Chemistry 2 Laboratory for Majors	4
PHYS 1330 & PHYS 1340	Physics II and Physics II Laboratory	4
! CHEM 2200 & CHEM 2205	Analytical Chemistry 1 and Analytical Chemistry 1 Laboratory (! Should be taken in in previous semester if at Madrid campus)	4
A&S Core		3
Credits		15

Year Three**Fall**

! CHEM 4610 & CHEM 4615	Biochemistry 1 and Biochemistry 1 Laboratory	4
CHEM 3330 or CHEM 3340	Physical Chemistry 1 or Physical Chemistry 2	3
A&S Core		9
	Credits	16

Spring

! CHEM 4620 & CHEM 4625	Biochemistry 2 and Biochemistry 2 Laboratory	4
! CHEB 3970	Undergraduate Research	1
! PPY 4410	Molecular Pharmacology	3
A&S Core		6
	Credits	14

Year Four**Fall**

! Chemical Biology Electives		3
CHEM 4470	Medicinal Chemistry	3
! CHEB 3970	Undergraduate Research	1
A&S Core		9
	Credits	16

Spring

! Chemical Biology Elective		6
CHEM 3100	The Chemical Literature	1
! CHEB 3970	Undergraduate Research	1
Elective or A&S Core (if needed)		6
	Credits	14
	Total Credits	120