

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 SLU 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 talks and posters 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 for employment.

Admission Requirements

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

Saint Louis University also accepts the Common Application and the Coalition 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 or HiSET.

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/>)

- All academic records must include an English translation. An official course-by-course transcript evaluation may be required and accepted.

science college core requirements are satisfied within the required major coursework.

Tuition

Tuition/Fee	Cost Per Year
Undergraduate Tuition	\$58,960
University Fees	\$1,000

Additional charges may apply. Other resources are listed below:

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

Cost of Attendance (<https://www.slu.edu/financial-aid/tuition-and-costs/cost-of-attendance.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-current/tuition-summer-current.pdf>)

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 2025, 99.6% of first-time freshmen and 92% of all students received financial aid (<https://www.slu.edu/financial-aid/>) and students received more than \$517 million in aid University-wide.

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

For more information on scholarships and financial aid, visit the Office of Student Financial Services (<https://www.slu.edu/financial-aid/>).

Learning Outcomes

- Graduates will be able to explain major principles in organic chemistry, biochemistry and pharmacology.
- Graduates will be able to conduct laboratory techniques and experiments safely.
- Graduates will be able to analyze quantitative data.
- Graduates will be able to apply chemistry principles to biology.
- 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

Code	Title	Credits
University Undergraduate Core (https://catalog.slu.edu/academic-policies/academic-policies-procedures/university-core/)		32-35
Major Requirements		78
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
CHEB 3970 or CHEM 3970 or BIOL 4980	Independent Research in Chemical Biology Independent Research in Chemistry Advanced Independent Study	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	College Physics I and College Physics I Laboratory University Physics I and University Physics I Laboratory	4
PHYS 1330 & PHYS 1340 or PHYS 1630 & PHYS 1640	College Physics II and College Physics II Laboratory University Physics II and University Physics II Laboratory	4
PPY 2540 or HSCI 3300 & HSCI 3310	Human Physiology Anatomy & Physiology I and Anatomy & Physiology I Lab	4
PPY 4410	Molecular Pharmacology	3
<i>Chemical Biology Electives</i> †		9
Students should select 9 credit hours with the 'Chemical Biology Elective' attribute.		
University Electives		10
Total Credits		120

† Students take three semesters, one credit per semester, regardless of which course is taken.

‡ A student interested in tailoring their degree towards a particular emphasis may customize their degree as follows:

- **Medicinal Chemistry Emphasis:** CHEM 5460 (Synthetic Organic Chemistry), CHEM 4400 (Organic Spectroscopy), plus 1 other Chemical Biology Elective.
- **Pharmacology Emphasis:** BIOL 3030 Genetics, BIOL 4930 Biochemical Pharmacology, plus 1 other Chemical Biology Elective.
- **Molecular Biology Emphasis:** BIOL 3030 Genetics, BIOL 4700 Molecular Biology, plus 1 other Chemical Biology Elective.
- **Pre-Med:** BIOL 3030 Genetics, plus 2 other Chemical Biology Electives.
- **Pre-Dental/PA/Pharmacy/Vet:** ANAT 1000 Basic Human Anatomy, PPY 2540 Human Physiology, STAT 3850 Foundation of Statistics, BIOL 4640 General Microbiology; OR, if anatomy/physiology lab is a required pre-requisite for the professional program you plan to apply to, select HSCI 3300/3310 Anatomy & Physiology I + Lab (in place of PPY 2540 Human Physiology) and select HSCI 3400 Anatomy & Physiology II as an elective in place of ANAT 1000 Basic Human Anatomy. Note that some professional programs may require Microbiology plus lab.

Non-Course Requirements

- All undergraduate majors must complete an exit interview with the department chair during their final semester.
- B.S. majors are required to submit an undergraduate thesis prior to graduation.

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.

Roadmap

This roadmap is just one example of a semester-by-semester plan of study for this program. There are other plans students can and do take. The plan of study for each particular student is established in

consultation with each student's academic advisor; *this roadmap does not replace academic advising appointments.*

Roadmap notes:

- This Roadmap assumes full-time enrollment unless otherwise noted.
- Courses/Milestones marked with an "!" are critical and must be completed in the semester listed in the Roadmap to ensure a timely graduation.
- Course availability and sequencing are subject to change.

Course	Title	Credits
Year One		
Fall		
! CHEM 1130 & CHEM 1115	General Chemistry 1 for Majors and General Chemistry 1 Laboratory (! Satisfies CORE 3800: Ways of Thinking: Natural and Applied Sciences)	4
! BIOL 1240 & BIOL 1245	General Biology: Information Flow and Evolution and Principles of Biology I Laboratory	4
MATH 1510	Calculus I (Satisfies CORE 3200: Was of Thinking: Quantitative Reasoning)	4
University Core or Electives		3
Credits		15
Spring		
! CHEM 1140 & CHEM 1125	General Chemistry 2 for Majors and General Chemistry 2 Laboratory	4
! BIOL 1260 & BIOL 1265	General Biology: Transformations of Energy and Matter and Principles of Biology II Laboratory	4
MATH 1520	Calculus II	4
University Core or Electives		3
Credits		15
Year Two		
Fall		
! CHEM 2430 & CHEM 2435	Organic Chemistry 1 for Majors and Organic Chemistry 1 Lab for Majors	4
PHYS 1610 & PHYS 1620 or PHYS 1310 and PHYS 1620	University Physics I or College Physics I and University Physics I Laboratory	4
! CHEM 2200 & CHEM 2205	Analytical Chemistry 1 and Analytical Chemistry 1 Laboratory (! Analytical 1 Lecture/lab sequence can be taken either Fall or Spring semester)	4
University Core or Electives		6
Credits		18
Spring		
! CHEM 2440 & CHEM 2445	Organic Chemistry 2 for Majors and Organic Chemistry 2 Laboratory for Majors	4

PHYS 1630 & PHYS 1640 or PHYS 1330 and PHYS 1340	University Physics II ¹ or College Physics II and College Physics II Laboratory	4
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University Core or Electives	6
Credits	14

Year Three**Fall**

! CHEM 4610 & CHEM 4615	Biochemistry 1 and Biochemistry 1 Laboratory	4
CHEM 3330	Physical Chemistry 1	3
CHEB 3970 or CHEM 3970 or BIOL 4980	Independent Research in Chemical Biology or Independent Research in Chemistry or Advanced Independent Study	1
PPY 2540 or HSCI 3300 and HSCI 3310	Human Physiology ² or Anatomy & Physiology I and Anatomy & Physiology I Lab	4

University Core or Electives	3
Credits	15

Spring

! CHEM 4620 & CHEM 4625	Biochemistry 2 and Biochemistry 2 Laboratory	4
PPY 4410	Molecular Pharmacology	3
CHEB 3970 or CHEM 3970 or BIOL 4980	Independent Research in Chemical Biology or Independent Research in Chemistry or Advanced Independent Study	1
CHEM 3100	The Chemical Literature	1

University Core or Electives	6
Credits	15

Year Four**Fall**

! Chemical Biology Electives ³		6
CHEB 3970 or CHEM 3970 or BIOL 4980	Independent Research in Chemical Biology (Requires completion of Senior Thesis before graduation) or Independent Research in Chemistry or Advanced Independent Study	1

University Core or Electives	9
Credits	16

Spring

! Chemical Biology Elective ³		3
CHEM 4470	Medicinal Chemistry (Can be taken in 3rd or 4th year (preferred))	3

University Core or Electives	6
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Submission of senior thesis and research presentation

Completion of Exit Interview		
Credits		12

Total Credits	120
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that one of your Chemical Biology Electives is HSCI-3400/3410 to complement.

³ Approved Chemical Biology Electives (must be selected from courses with the "Chemical Biology Elective" attribute).

A student interested in tailoring their degree towards a particular emphasis may customize their degree as follows:

- Medicinal Chemistry Emphasis: CHEM 5460 (Synthetic Organic Chemistry), CHEM 4400 (Organic Spectroscopy), plus 1 other Chemical Biology Elective.
- Pharmacology Emphasis: BIOL 3030 Genetics, BIOL 4930 Biochemical Pharmacology, plus 1 other Chemical Biology Elective.
- Molecular Biology Emphasis: BIOL 3030 Genetics, BIOL 4700 Molecular Biology, plus 1 other Chemical Biology Elective.
- Pre-Med: BIOL 3030 Genetics, plus 2 other Chemical Biology Electives.
- Pre-Dental/PA/Pharmacy/Vet: ANAT 1000 Basic Human Anatomy, PPY 2540 Human Physiology, STAT 3850 Foundation of Statistics, BIOL 4640 General Microbiology; OR, if anatomy/physiology lab is a required pre-requisite for the professional program you plan to apply to, select HSCI 3300/3310 Anatomy & Physiology I + Lab (in place of PPY 2540 Human Physiology) and select HSCI 3400 Anatomy & Physiology II as an elective in place of ANAT 1000 Basic Human Anatomy. Note that some professional programs may require Microbiology plus lab.

Contact Us

For more information about undergraduate chemistry programs, please call 314-977-2850 or email chemundergrad@slu.edu.

¹ University Physics (PHYS 1610-1640) is recommended. However, Physics (PHYS 1310-1340) also fulfills the physics requirement.

² Note: HSCI-2200 Medical Terminology (3) is a pre-req for HSCI-3300 and is offered Fall, Winter, Spring and Summer online. HSCI-3300 and HSCI-3310 must be taken concurrently, and it is strongly recommended