

# CHEMICAL BIOLOGY, M.S.

A master's degree in chemical biology from Saint Louis University provides advanced instruction and training in synthetic organic chemistry, biology and pharmacology. The core of this SLU degree includes organic and medicinal chemistry, molecular biology and pharmacology and can be tailored to match a student's particular interests within the field of chemical biology.

## Program Highlights

Saint Louis University's master's degree in chemical biology provides excellent preparation for further studies toward a Ph.D. or transitioning to a professional career in the life sciences industry. Employment opportunities include a variety of jobs in the pharmaceutical, biotechnology and materials industries.

Graduate students in SLU's chemical biology program have access to a number of research tools, including:

- Bruker 400 and 700 MHz NMR spectrometers
- Bruker-EMX EPR, UV-Vis, and FTIR spectrometers
- Research-grade spectrofluorometers
- GC-MS, LC-MS, and specialized mass spectrometers
- Computational facilities with modern molecular modeling software
- Bruker CCD X-ray diffractometer facility
- Core facilities in the School of Medicine (<https://www.slu.edu/medicine/>) (e.g., protein, microscopy, etc.)

## Curriculum Overview

SLU's Master of Science in Chemical Biology offers specialization in medicinal chemistry, molecular biology and pharmacology, with cross-disciplinary activity strongly encouraged.

The requirements for the thesis-based M.S. degree include:

- A minimum of 24 credits of post-baccalaureate coursework (exclusive of thesis research)
- Six credits of thesis research (CHEB 5990)
- A thesis
- A public oral presentation and a private oral examination

Required coursework includes medicinal chemistry, molecular biology and pharmacology taught by faculty from the corresponding departments. Electives are chosen to complement a student's interests and the research program that they join.

Many graduate courses in chemistry are scheduled in the evening, allowing students to complete the degree part-time. This flexibility allows students to tailor a program of study to suit their needs.

For students who hold a bachelor's degree and are interested in completing the doctoral program in chemistry, there is a mechanism to transition into the Ph.D. program after completing the master's requirements. A total of 39 credits are required, including 12 credits from dissertation research credits. Students will develop an appropriate coursework track with mentors who will be approved by the graduate program director and/or the department chair.

Graduate Handbook (<https://www.slu.edu/science-and-engineering/academics/chemistry/pdfs/chemical-biology-masters-program-handbook.pdf>)

## Fieldwork and Research Opportunities

Graduate students are active in the research areas of medicinal chemistry, biochemistry, molecular biology, cell biology and pharmacology. Research groups regularly publish in top-ranked journals and present at national and international conferences.

## Careers

Chemical biology graduates are employed in a diverse array of fields such as pharmaceuticals, biotechnology, patent law, biomedical engineering and academic research.

## Admission Requirements

Applicants should possess sufficient GPA and TOEFL (if applicable) scores, and a bachelor's degree from an accredited college or university, usually in chemistry, biochemistry or biology, although other science majors will be considered.

Admission normally requires undergraduate coursework including (minimum credits in parentheses):

- Calculus (4)
- Organic chemistry with labs (8)
- Physics with labs (8)
- Physical chemistry (3)
- Biochemistry (3)
- Biology (6)

Students who do not meet these criteria may complete these prerequisites as part of their graduate program, though not for graduate credit.

## Application Requirements

- Application form
- Official transcripts
- Three letters of recommendation
- Résumé
- Goal statement
- Interview (desired)

## Requirements for International Students

All admission policies and requirements for domestic students apply to international students. International students must also meet the following additional requirements:

- Demonstrate English Language Proficiency (<https://catalog.slu.edu/academic-policies/office-admission/undergraduate/english-language-proficiency/>)
- Academic records, in English translation, of students who have undertaken postsecondary studies outside the United States must include:
  - 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
- Any honors or degrees received.
- WES and ECE transcripts are accepted.
- In order to be issued an I-20 for your F-1 visa application, students must submit financial documents. Proof of financial support that must include:
  - A letter of financial support from the person(s) or sponsoring agency funding the student's 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 the student's study at the University

## Application Deadlines

Students who want to be considered for the summer and fall semesters must submit their applications by Jan. 15.

## Review Process

A three-person committee votes on whether to accept applicants.

## Tuition

Tuition	Cost Per Credit
Graduate Tuition	\$1,370

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, Assistantships and Financial Aid

For priority consideration for a graduate assistantship, apply by the program admission deadlines listed. Fellowships and assistantships provide a stipend and may include health insurance and a tuition scholarship for the duration of the award.

Explore Scholarships and Financial Aid Options (<https://www.slu.edu/financial-aid/>)

## Learning Outcomes

1. Graduates will be able to assess relevant literature in chemical biology.
2. Graduates will be able to apply the major practices, theories, or research methodologies in chemical biology.
3. Graduates will be able to apply chemistry principles to biology.
4. Graduates will be able to articulate arguments or explanations in both oral and written forms.
5. Graduates will be able to evidence scholarly and professional integrity in chemical biology.

## Requirements

Code	Title	Credits
<b>Required Courses</b>		
CHEM 5630	Introduction to Chemical Biology and Biotechnology	3
CHEM 5470	Medicinal Chemistry	3
PPY 5410 or PPY 5110 & PPY 5120	Molecular Pharmacology <sup>†</sup> Introduction to Pharmacology and Systems Physiology and Pharmacology I	3
<b>Required Research Courses</b>		
CHEB 5110	Introduction to Chemical Biology Research I	1
CHEB 5120	Introduction to Chemical Biology Research II	2
CHEB 5970	Research Topics	3
CHEB 5990	Thesis Research	6
<b>Electives</b>		
Select 9 credits in 5000 level courses in Chemistry, Biology, or Pharmacology <sup>‡</sup>		9
<b>Total Credits</b>		<b>30</b>

## Non-Course Requirements

A public oral presentation and a private oral examination.

## Continuation Standards

Students must maintain a cumulative grade point average (GPA) of 3.00 in all graduate/professional courses.

<sup>†</sup> PPY 5110 Introduction to Pharmacology (1 cr) and PPY 5120 Systems Physiology and Pharmacology I (2 cr) may be taken in place of PPY 5410 Molecular Pharmacology (3 cr).

<sup>‡</sup> Selected from 5000-level courses in consultation with student's research mentor. Electives should be selected from chemistry, biology, pharmacology or biochemistry departments. Electives can also be fulfilled by taking 5000-level courses in other disciplines with approval by a program coordinator and the student's committee.

<sup>‡</sup> Selected from 5000-level courses in consultation with student's research mentor. Electives should be selected from chemistry, biology, pharmacology or biochemistry departments. Electives can also be fulfilled by taking 5000-level courses in other disciplines with approval by a program coordinator and the student's committee.

<sup>±</sup> PPY 5110 Introduction to Pharmacology (1 cr) and PPY 5120 Systems Physiology and Pharmacology I (2 cr) may be taken in place of PPY 5410 Molecular Pharmacology (3 cr).

## 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
<b>Year One</b>		
<b>Summer</b>		
CHEB 5110	Introduction to Chemical Biology Research I	1
<b>Credits</b>		<b>1</b>
<b>Fall</b>		
CHEM 5630	Introduction to Chemical Biology and Biotechnology	3
CHEB 5120	Introduction to Chemical Biology Research II	2
BIOL 5700	Advanced Molecular Biology	3
<b>Credits</b>		<b>8</b>
<b>Spring</b>		
PPY 5410	Molecular Pharmacology	3
CHEM 5470	Medicinal Chemistry	3
<b>Credits</b>		<b>6</b>
<b>Year Two</b>		
<b>Summer</b>		
CHEB 5970	Research Topics	3
<b>Credits</b>		<b>3</b>
<b>Fall</b>		
CHEB 5990	Thesis Research §*	3
Form thesis committee and submit written research progress report by November 1st.		
Elective †		3
<b>Credits</b>		<b>6</b>
<b>Spring</b>		
CHEB 5990	Thesis Research §*	3
! Elective †		3
Submit written thesis and give oral thesis defense		
<b>Credits</b>		<b>6</b>
<b>Total Credits</b>		<b>30</b>

† CHEM 5630 Introduction to Chemical Biology and Biotechnology (3 cr) is only offered every other fall.

‡ **Electives (must take at least two courses):** Electives can be fulfilled by taking 5000-level courses in chemistry, pharmacology or biology. Electives in other disciplines such as math, computer science, and engineering may be taken with approval by a program coordinator and the student's committee.

§ **CHEB 5990 Thesis Research:** Students are required to complete six credits of thesis research. This requirement is typically completed in the second year. The number of credits can vary each semester, but a student cannot register for zero credits of research until the six credits have been completed.

\* Students intending to enter into a SLU Ph.D. program under the M.A. – chemical biology program follow the M.S. roadmap but do not register for CHEB 5990.

## Contact Us

For additional information about our program, please contact:

Christopher Arnatt, Ph.D.  
 Program coordinator, chemical biology program  
 (314) 977-8290  
 chemicalbiology@slu.edu