

CHEMICAL BIOLOGY, M.S.

A master's degree in chemical biology will provide advanced instruction and training in synthetic organic chemistry, biology, and pharmacology. The core of this degree will include organic and medicinal chemistry, molecular biology, and pharmacology and can be tailored to match the student's particular interests within the field of chemical biology. The master's degree in chemical biology would provide excellent preparation for further studies towards 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 the 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 (e.g., protein, microscopy, etc.)

Curriculum Overview

The 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 the student's interest and the research program that they join.

Many graduate courses in chemistry are scheduled in the evening, allowing students to complete the degree as a part-time student. 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 the master's requirements are completed. A total of 39 credits are required, including 12 credits from dissertation research credits. Students will develop an appropriate coursework track with a mentor that will be approved by the graduate program director and/or the department chair.

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.

Career Options

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 credit hours in parentheses): calculus (4), organic chemistry with labs (8), physics with labs (8), physical chemistry (3), biochemistry (3), and 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 and fee
- Official transcripts
- Three letters of recommendation
- GRE
- Résumé
- Goal statement
- Interview (desired)

Requirements for International Students

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.

Application Deadlines

Students who want to be considered for the summer and fall semesters must submit their application by Jan. 15. Students who want to be considered for the spring semester should apply by Oct. 15.

Review Process

A three-person committee votes whether to accept applicants.

Scholarships, Assistantships and Financial Aid

For priority consideration for graduate assistantship, applicants should complete their applications 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.

For more information, visit the student financial services office online at <http://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
Required Courses		
CHEB 5630	Intro to Chemical Biology & Biotechnology	3
CHEM 5470	Principles of Medicinal Chemistry	3
BIOL 5700	Advanced Molecular Biology	3
PPY 5110	Introduction to Pharmacology	1
PPY 5120	Systems Physiology and Pharmacology I	2
Required Research Courses		
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
Electives		
<i>Select 6 credits [‡]</i>		6
Total Credits		30

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.

[†] Students intending to enter into a SLU PhD program under the MA – Chemical Biology program follow the MS coursework roadmap but do not register for CHEB 5990.

[‡] 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 Program Coordinator and student's committee.

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		
Summer		
! CHEB 5110	Intro to Chemical Biology Research I	1
Credits		1
Fall		
!BIOL 5700	Advanced Molecular Biology [†]	3
! CHEB 5120	Intro to Chemical Biology Research II	2
! CHEB 5630	Intro to Chemical Biology & Biotechnology [†]	3
Credits		8
Spring		
!CHEM 5470	Principles of Medicinal Chemistry	3
! CHEB 5990	Thesis Research ^{§*}	3
! Elective [‡]		3
Credits		9
Year Two		
Summer		
! CHEB 5970	Research Topics	3
Credits		3
Fall		
! CHEB 5990	Thesis Research ^{§*}	3
!PPY 5110	Introduction to Pharmacology [†]	1
!PPY 5120	Systems Physiology and Pharmacology I [†]	2
Form thesis committee and submit written research progress report by November 1st.		
Credits		6
Spring		
! Elective [‡]		3
Submit written thesis and give oral thesis defense		
Credits		3
Total Credits		30

[†] The PPY 5110 Introduction to Pharmacology (1 cr) and PPY 5120 Systems Physiology and Pharmacology I (2 cr) sequence may be taken in the first year and either BIOL 5700 Advanced Molecular Biology (3 cr) or CHEB 5630 taken in the second year. All four are fall semester courses.

[‡] **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 Program Coordinator and student's committee.

- § **CHEB 5990 Thesis Research:** Students are required to complete 6 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 6 credits have been completed.
- * Students intending to enter into a SLU PhD program under the MA – Chemical Biology program follow the MS Roadmap but do not register for CHEB 5990.