BIOCHEMISTRY (BS)

The Department of Chemistry & Biochemistry offers four undergraduate major degree programs: BA in Chemistry, BA in Biochemistry, BS in Chemistry, and the BS in Biochemistry. These programs follow prescribed professional guidelines and the CHEM-BS degree is approved by the American Chemical Society. Loyola programs are unique because of the close contact between students and faculty, due to smaller class sizes in advanced classes. Chemistry & Biochemistry faculty members spend significant time assisting students both in and out of the classroom.

Loyola's Bachelor of Science (BS) degree programs in Chemistry or Biochemistry offer opportunities to excel in a fundamental area of science. The prestige of these programs is based on the success of students in developing their goals for work in industry, academia, and/or diverse professional schools and in adopting the Loyola mission of applying knowledge in the service of humanity.

The programs in Chemistry and Biochemistry lay firm foundations for majors and give other students a cultural background in these fields. The BS programs are intended primarily for those undergraduates who have career goals in Chemistry or Biochemistry (i.e., an industrial or academic chemistry career most probably following graduate training for the MS and/or PhD degrees) but are also good preparation for careers in medicine, law, pharmacy and other professions.

The BA programs are intended for those undergraduates who have career goals in fields other than Chemistry or Biochemistry, but for which a strong background is desirable (e.g., medicine, dentistry, technical sales, patent law). These programs are also intended to provide additional schedule flexibility for students (e.g., study abroad, early graduation, double majors).

Related Programs

Major

- Biochemistry (BA) (https://catalog.luc.edu/undergraduate/arts-sciences/chemistry-biochemistry/biochemistry-ba/)
- Chemistry (BA) (https://catalog.luc.edu/undergraduate/arts-sciences/chemistry-biochemistry/chemistry-ba/)
- Chemistry (BS) (https://catalog.luc.edu/undergraduate/arts-sciences/chemistry-biochemistry/chemistry-bs/)

Curriculum

LUC Chemistry is taking a modern, integrated approach to foundational coursework.

- Aligns with the latest American Chemical Society (ACS) and American Association of Medical Colleges (AAMC) standards & guidelines
- Themes: structure-activity relationships; culture and practice of science; energy; polymers, proteins, and macromolecules; sustainability; chemical synthesis, purification, characterization, and analysis.
- With such knowledge and skills, you should be prepared to further excel in upper-level coursework that specializes your work in the specific major you have chosen.

In addition to the required courses listed below,CHEM 300 Undergraduate Research is strongly recommended. Credit hours earned in CHEM 300 Undergraduate Research or CHEM 380 Chemistry Seminar do not count as elective hours satisfying the BS degree requirement. Both CHEM 300 Undergraduate Research and CHEM 380 Chemistry Seminar are required for Departmental honors. The CHEM-BS degree is accredited by the American Chemical Society.

Code	Title	Hours
Chemistry Courses Required		
CHEM 160	Chemical Structure and Properties	3
CHEM 161	Chemical Structure and Properties Laboratory	1
CHEM 180	Chemical Reactivity I	3
CHEM 181	Chemical Reactivity I Lab	1
CHEM 240	Chemical Reactivity II	3
CHEM 242	Chemical Synthesis Laboratory	2
CHEM 260	Quantitative Methods in Chemistry	3
CHEM 272	Analytical Chemistry Laboratory	2
CHEM 305	Physical Biochemistry for the Biological Sciences	3
CHEM 306	Physical Biochemistry Lab	1
CHEM 307	Inorganic Chemistry	3
CHEM 370	Biochemistry I	3
CHEM 371	Biochemistry II	3
CHEM 372	Biochemistry Laboratory I	2
CHEM 373	Biochemistry Laboratory II	2
Biochemistry Focus Elective		
Select one of the following:		3
CHEM 365	Proteomics	
CHEM 385	Advanced Enzyme Kinetics and Mechanisms	
CHEM 386	The Chemistry of Enzymes	
CHEM 387	Plant Biochemistry	
CHEM 388	Biophysical Chemistry	
Biochemistry Elective		
Select one of the following:		3
CHEM 323	Medicinal Chemistry	
CHEM 365	Proteomics	
CHEM 385	Advanced Enzyme Kinetics and Mechanisms	
CHEM 386	The Chemistry of Enzymes	
CHEM 387	Plant Biochemistry	
CHEM 388	Biophysical Chemistry	
CHEM 396	Special Topics in Biochemistry	
BIOL 380	Genetics and Evolution of Development	
BIOL 382	Molecular Genetics	
BIOL 388	Bioinformatics	
BIOL 389	Introduction to Pharmacology	
Physics Courses Required		
PHYS 111	College Physics I Lec / Dis	3
PHYS 112	College Physics II Lec/Disc	3
PHYS 111L	College Physics Laboratory I	1
PHYS 112L	College Physics Lab II	1
Math Courses Required		
MATH 131	Applied Calculus I	3
or MATH 161	Calculus I	
MATH 132	Applied Calculus II	3
or MATH 162	Calculus II	
STAT 203	Introduction to Probability & Statistics	3

Biology Courses Required		
BIOL 101	General Biology I	3
BIOL 102	General Biology II	3
BIOL 111	General Biology I Lab	1
BIOL 112	General Biology II Lab	1
BIOL 251	Cell Biology	3
BIOL 282	Genetics	3
BIOL 283	Genetics Laboratory	1
Total Hours		**73**

- Core requirements (https://catalog.luc.edu/undergraduate/university-requirements/university-core/)
- Please visit http://www.luc.edu/cas/academics_degreerequirements.shtml#college (https://www.luc.edu/cas/academics_degreerequirements.shtml/#college) to view other CAS requirements.
- For chemistry course descriptions and pre and co-requisite information, please visit here (https://catalog.luc.edu/undergraduate/arts-sciences/chemistry-biochemistry/#coursestext).

All chemistry majors are assigned a chemistry faculty advisor. Please meet with your advisor on a regular basis, at least twice a year, for assistance with your chemistry schedule, research possibilities, graduate school information and more. If you do not know who your advisor is please call the chemistry department at 773/508-3100 or come to the department office located in Flanner Hall room 125.

Suggested Sequence of Courses

The below sequence of courses is meant to be used as a suggested path for completing coursework. An individual student's completion of requirements depends on course offerings in a given term as well as the start term for a major or graduate study. Students should consult their advisor for assistance with course selection.

Students **not** placing in MATH 118 Precalculus II or higher cannot start the Chemistry sequence until MATH 117 Precalculus I is completed with a grade of C- or better. Such students are advised to enroll in first-year Chemistry courses in the summer sessions (after meeting the math requirement) in order to complete the major in four years.

Course	Title	Hours
Freshman		
Fall		
BIOL 101 & BIOL 111	General Biology I and General Biology I Lab	4
CHEM 160	Chemical Structure and Properties	3
CHEM 161	Chemical Structure and Properties Laboratory	1
MATH 131 or MATH 161	Applied Calculus I or Calculus I	3-4
	Hours	**11-12**
Spring		
BIOL 102 & BIOL 112	General Biology II and General Biology II Lab	4
CHEM 180	Chemical Reactivity I	3
CHEM 181	Chemical Reactivity I Lab	1
MATH 132 or MATH 162	Applied Calculus II or Calculus II	3-4
	Hours	**11-12**
Sophomore		
Fall		
BIOL 282	Genetics	3
CHEM 240	Chemical Reactivity II	3
PHYS 111 & 111L	College Physics I Lec / Dis and College Physics Laboratory I	4
STAT 203	Introduction to Probability & Statistics	3
	Hours	**13**
Spring		
BIOL 251	Cell Biology	3
BIOL 283	Genetics Laboratory	1
CHEM 242	Chemical Synthesis Laboratory	2
CHEM 260	Quantitative Methods in Chemistry	3
PHYS 112 & 112L	College Physics II Lec/Disc and College Physics Lab II	4
	Hours	**13**
Junior		
Fall		
CHEM 272	Analytical Chemistry Laboratory	2
CHEM 305	Physical Biochemistry for the Biological Sciences	3
CHEM 370	Biochemistry I	3
	Hours	**8**
Spring		
CHEM 306	Physical Biochemistry Lab	1
CHEM 307	Inorganic Chemistry	3
CHEM 371	Biochemistry II	3
	Hours	**7**
Senior		
Fall		
CHEM 372	Biochemistry Laboratory I	2
Biochemistry Elective (p. 2)		3
	Hours	**5**
Spring		
CHEM 373	Biochemistry Laboratory II	2
Biochemistry Elective (p. 2)		3
	Hours	**5**
	Total Hours	**73-75**

Two Biochemistry Electives Are Required

One course must be from among these Biochemistry Focus Electives:

Code	Title	Hours
CHEM 365	Proteomics	3
CHEM 385	Advanced Enzyme Kinetics and Mechanisms	3
CHEM 386	The Chemistry of Enzymes	3
CHEM 387	Plant Biochemistry	3
CHEM 388	Biophysical Chemistry	3

and for the other you can choose from any of these Biochemistry Electives:

Code	Title	Hours
CHEM 323	Medicinal Chemistry	3
CHEM 365	Proteomics	3
CHEM 385	Advanced Enzyme Kinetics and Mechanisms	3
CHEM 386	The Chemistry of Enzymes	3
CHEM 387	Plant Biochemistry	3
CHEM 388	Biophysical Chemistry	3
CHEM 396	Special Topics in Biochemistry	1-3
BIOL 380	Genetics and Evolution of Development	3
BIOL 382	Molecular Genetics	3
BIOL 388	Bioinformatics	3

CHEM 300 Undergraduate Research and CHEM 380 Chemistry Seminar are strongly recommended and required to receive Departmental Honors with graduation. Credit hours earned in CHEM 300 Undergraduate Research and/or CHEM 380 Chemistry Seminar do not count as elective hours satisfying the BIOC degree requirement. CHEM 361 Principles of Biochemistry does not count towards the BIOC-BA degree.

Mathematics Preparedness for Chemistry

Students intending to register for a chemistry course will need a background in mathematics that is commensurate with the computational requirements of the chemistry course. Evidence of math preparedness is obtained from results of the ACT/SAT and of a Mathematics Placement Assessment (MPA) administered by the College in conjunction with the Department of Mathematics and Statistics. Students who are found to be mathematically under prepared are required to pass the appropriate course or sequence of courses in mathematics with a grade of "C-" or better before they register for a chemistry course. More information regarding placement by ACT/SAT and the MPA can be found at http://www.luc.edu/math/placement/.

College of Arts and Sciences Graduation Requirements

All Undergraduate students in the College of Arts and Sciences are required to take two Writing Intensive courses (6 credit hours) as well as complete a foreign language requirement at 102-level or higher (3 credit hours) or a language competency test. More information can be found here (https://www.luc.edu/cas/college-requirements/).

Additional Undergraduate Graduation Requirements

All Undergraduate students are required to complete the University Core, at least one Engaged Learning course, and UNIV 101. SCPS students are not required to take UNIV 101. Nursing students in the Accelerated BSN program are not required to take core or UNIV 101. You can find more information in the University Requirements (https://catalog.luc.edu/undergraduate/university-requirements/) area.

Learning Outcomes

At the completion of the Undergraduate Major in Chemistry or Biochemistry, students will be able to:

- answer knowledge and comprehension type questions related to fundamental chemical concepts and demonstrate fluency with basic facts, terminology, and principles in the various subfields of chemistry.
- understand and describe the chemical basis of life, our natural resources and environments, and the universe.
- retrieve, research, synthesize, and critically evaluate scientific literature.
- design and implement experiments that test predictive hypotheses, gather relevant data, analyze results, and interpret the significance of these results.
- operate state of the art equipment used by chemists and biochemists.
- engage in scientific reasoning with claims based on supported evidence and communicate effectively results and interpretations of scientific research.