

CHEMISTRY (BS)



This program was approved for students entering the university in the Summer 2022–Spring 2023 catalog year. For more information about catalog year, go to Catalog Year Information (<http://catalog.louisville.edu/undergraduate/university-wide-unit-specific-policies/catalog-year/>).

Bachelor of Science in Chemistry

Unit: College of Arts and Sciences (AS) (<http://www.louisville.edu/a-s/>)

Department: Chemistry (<http://louisville.edu/chemistry/>)

Academic Plan Code(s): See Track Requirements tab

Program Information

The BS in Chemistry degree program is designed to prepare professional chemists for industrial, governmental, academic, and research positions. This curriculum meets approved requirements for professional training.

Completion of this degree requires work to be submitted for the department's Learning Outcomes Measurement. For details, contact the department.

Degree Summary

Code	Title	Hours
	General Education Requirements (http://catalog.louisville.edu/undergraduate/general-education-requirements/) ¹	31
	College/School Requirements	13-15
	Program/Major Requirements ¹	25
	Supporting Courses	16-18
	Track Requirements	34-51
Minimum Total Hours		121

¹ Some credit hours from the General Education Requirements may be satisfied by courses defined by the program, in which case additional electives may be required to complete the minimum hours for the degree. To complete the degree in the minimum number of hours listed for the Business track, some hours from the General Education Requirements must be satisfied by courses defined by the unit and/or program. Using other courses to satisfy General Education requirements will require additional hours to complete the degree requirements.

Specific coursework information can be found on the Degree Requirements tab.

Early Start Program (Jointly with the College of Education and Human Development)

The Master of Arts in Teaching program in conjunction with the undergraduate programs in Chemistry, Biology, and Mathematics offers a comprehensive and professionally-focused program leading to an additional degree of MAT Middle or Secondary Education. This early start program enables superior students to receive two degrees within five years. A total of 148 credits are required for the dual degrees: 121 credits of coursework devoted toward the baccalaureate degree and 36 credits toward the MAT, with nine hours double-counted. This program will be available for students who are entering their junior year. They may take graduate level courses in the College of Education and Human Development (CEHD) in their 4th year of study.

The current qualifications for the joint degree program have been agreed upon by discipline faculty from the Colleges of Arts and Sciences and Education and Human Development. The criteria vary by discipline. Students enrolling in the accelerated program will be non-thesis students and must adhere to all policies pertaining to Graduate Students. All interested students must submit an application to the College of Education and Human Development (CEHD) MAT program and meet the admission criteria.

Departmental Admission Requirements

Admission to the major in Chemistry requires completion of CHEM 202 (or equivalent course from another institution) with a grade of C or better.

The Application for Major form can be found on the Arts & Sciences Advising Center website (<http://louisville.edu/artsandsciences/advising/apply/>).

General Education Requirements

Code	Title	Hours
	General Education Requirements (http://catalog.louisville.edu/undergraduate/general-education-requirements/) [*]	31

The following courses are required by the program and can satisfy the respective General Education Requirement:

CHEM 201	General Chemistry I - S
CHEM 207	Introduction to Chemical Analysis I - SL
MATH 205	Calculus I - QR
PHYS 221	Fundamentals of Physics I - S
	or PHYS 295 Introductory Laboratories I - SL

^{*}All degrees require the completion of the University-wide General Education Program (link provided above). Some General Education requirements may be met in the requirements for the major or supporting coursework, in which case additional electives may be required to complete the minimum hours for the degree. To complete the Business track in the **minimum number of hours** listed, some hours from the General Education Requirements must be satisfied by courses defined by the unit and/or program.

College/School Requirements

Code	Title	Hours
Arts & Sciences Requirements		
GEN 100	Student Success Center First Year Experience	1
	or GEN 101 Arts & Sciences First Year Experience	
Foreign Language ¹		6-8

Electives in Humanities or Social Sciences at the 300-level or above² 6
WR—two approved courses at the 300 level or above³

Minimum Total Hours 13-15

Program/Major Requirements

Code	Title	Hours
Department of Chemistry		
CHEM 201	General Chemistry I - S ⁴	3
CHEM 202	General Chemistry II - S	3
CHEM 207	Introduction to Chemical Analysis I - SL ⁴	1
CHEM 208	Introduction to Chemical Analysis II - SL	1
CHEM 209	Introduction to Chemical Analysis III	1
CHEM 210	Introduction to Chemical Analysis IV	1
CHEM 341	Organic Chemistry I	3
CHEM 342	Organic Chemistry II	3
CHEM 343	Organic Chemistry Laboratory I	2
CHEM 344	Organic Chemistry Laboratory II	2
CHEM 425	Instrumental and Statistical Analysis	3
CHEM 470	Physical Chemistry Laboratory - WR	2

Minimum Total Hours 25

Code	Title	Hours
Supporting Courses		
MATH 205	Calculus I - QR	4
MATH 206	Calculus II	4
Complete one of the following sequences:		8-10
Sequence 1:		
PHYS 221	Fundamentals of Physics I - S	
PHYS 222	Fundamentals of Physics II - S	
PHYS 223	Fundamentals of Physics Lab I - SL	
PHYS 224	Fundamentals of Physics Laboratory II - SL	
Sequence 2:		
PHYS 295	Introductory Laboratories I - SL	
PHYS 296	Introductory Laboratories II - SL	
PHYS 298	Introductory Mechanics, Heat and Sound - S	
PHYS 299	Introductory Electricity, Magnetism and Light	

Minimum Total Hours 16-18

Code	Title	Hours
Track Requirements		
		34-51

At least 50 of the total minimum hours required must be at the 300 level or above.

Code	Title	Hours
Culminating Undergraduate Experience (Graduation requirement)		

Requirement fulfilled by completing one of the following:

CHEM 390	Undergraduate Research - WR, CUE	
CHEM 391	Undergraduate Research - CUE	
CHEM 392	Undergraduate Research - CUE	
CHEM 420	Cooperative Internship in Chemistry - WR, CUE	
CHEM 430	Practicum in Chemistry Education - CUE	
CHEM 491	Undergraduate Research - CUE	

CHEM 528	Contemporary Methods of Organic Synthesis and Analysis - CUE	
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- Completion of the second semester of a single foreign language; hours will vary depending on language taken
- In addition to courses counted toward General Education
- May be incorporated into other degree requirements
- Fulfills General Education requirement.
- CHEM 470 plus 3 semester hours of another WR course will fulfill the WR requirement.

Track Requirements

Students completing the BS in Chemistry may pursue the standard degree track or a specialized track in Biochemistry or a track in Business. Requirements for all three of these options are listed below.

Chemistry BS (non-track option)

Academic Plan Code(s): CHM_BS

Code	Title	Hours
Department of Chemistry		
CHEM 426	Instrumental and Statistical Analysis Laboratory - WR	2
CHEM 445	Survey of Biochemistry	3
or CHEM 545	Biochemistry I	
CHEM 465	Physical Chemistry I	3
CHEM 466	Physical Chemistry II	3
CHEM 515	Inorganic Chemistry	3
CHEM 527	Spectroscopic Identification of Organic Compounds - WR	3
CHEM 528	Contemporary Methods of Organic Synthesis and Analysis - CUE	2
CHEM 529	Contemporary Methods of Inorganic Synthesis and Analysis - WR	2
CHEM research ¹		3
MATH 301	Calculus III	4
Elective ²		3
Elective ³		3
Minimum Total Hours		34

Culminating Undergraduate Experience Undergraduate Research

- Choose from CHEM 390, CHEM 391, CHEM 392, CHEM 491, or CHEM 492.
- Electives in Mathematics, Physics or Chemistry at 300 level or above.
- Elective in Natural Sciences Division, other than Chemistry, at 300 level or above.

Track in Biochemistry

Academic Plan Code(s): CHM_BS_BIO

This degree track is designed to prepare students for a career that combines both chemistry and modern biology.

Code	Title	Hours
Department of Chemistry		
CHEM 465	Physical Chemistry I	3

CHEM 466	Physical Chemistry II	3
CHEM 545	Biochemistry I	3
CHEM 547	Biochemistry II	3
CHEM 546	Biochemistry Laboratory	2
Undergraduate Research or Cooperative Internship		3
Supporting Courses		
BIOL 240	Unity of Life - S	3
BIOL 242	Diversity of Life - S	3
BIOL 329	Cellular and Molecular Biology	3
BIOL 330	Genetics and Molecular Biology	3
BIOL 331	Genetics and Molecular Biology: Laboratory	2
CHEM or BIOL electives - see table below (at least 3 hours of which must be in Chemistry) ³		4-6
MATH 301	Calculus III	4
Minimum Total Hours		39-41

¹ Fulfills General Education requirement.

² CHEM 470 plus 3 semester hours of another WR course will fulfill the WR requirement

³ As many as 3 additional hours in Undergraduate Research in Chemistry may be applied toward the degree. With the consent of the instructor, graduate level courses in Chemistry may also be used.

Code	Title	Hours
BIOL 457	Microbiology	3
or BIOL 485	Microbial Physiology - CUE, WR	
BIOL 458	Microbiology Laboratory	1
BIOL 400	Histology	4
BIOL 465	Principles of Physiology	3
BIOL 541	Medicinal Plant Biochemistry - WR, CUE	3
BIOL 542	Gene Structure and Function - WR	3
CHEM 430	Practicum in Chemistry Education - CUE	1
CHEM 515	Inorganic Chemistry	3
CHEM 527	Spectroscopic Identification of Organic Compounds - WR	3
CHEM 528	Contemporary Methods of Organic Synthesis and Analysis - CUE	2
CHEM 529	Contemporary Methods of Inorganic Synthesis and Analysis - WR	2
CHEM 555	Theory and Application of Computational Chemistry	3
CHEM 557	Bio-Organic Phenomena	3

Track in Business

Academic Plan Code(s): CHM_BS_BUS

This degree track combines a general program in chemistry with a fundamental program in business. The curriculum is designed to prepare chemists for industrial and governmental positions.

Code	Title	Hours
Department of Chemistry		
CHEM 441	Elements of Physical Chemistry	3
or CHEM 465	Physical Chemistry I	
CHEM 445	Survey of Biochemistry	3

or CHEM 545	Biochemistry I	
CHEM 515	Inorganic Chemistry	3
Select one of the following:		3
CHEM 426	Instrumental and Statistical Analysis Laboratory - WR	
CHEM 528	Contemporary Methods of Organic Synthesis and Analysis - CUE	
CHEM 529	Contemporary Methods of Inorganic Synthesis and Analysis - WR	
Chemistry Research or Internship - Select one of the following:		3
CHEM 390	Undergraduate Research - WR, CUE	
CHEM 391	Undergraduate Research - CUE	
CHEM 392	Undergraduate Research - CUE	
CHEM 420	Cooperative Internship in Chemistry - WR, CUE	
CHEM 491	Undergraduate Research - CUE	
CHEM 492	Undergraduate Research	

CHEM electives at 300 level or above (other than Independent Study) 2-3
 - See table below³

Supporting Courses

ECON 201	Principles of Microeconomics - SB	3
ECON 202	Principles of Macroeconomics - SB	3
CIS 250	Introduction to Data and Information Management	3
CIS 300	Computer Information Systems	3
ACCT 201	Principles of Financial Accounting	3
ACCT 202	Principles of Managerial Accounting	3
Select one of the following:		3
BSTA 201	Business Statistics	
PSYC 301	Statistics for Psychology	
SOC 301	Introduction to Social Statistics	
MGMT 301	Management and Organizational Behavior	3
MKT 301	Principles of Marketing	3
FIN 301	Corporate Finance	3
Elective in the School of Business at the 300-level or above		3

Culminating Undergraduate Experience (Graduation requirement)

Requirement fulfilled by completing one of the following approved CUE courses:

CHEM 390	Undergraduate Research - WR, CUE	
CHEM 391	Undergraduate Research - CUE	
CHEM 392	Undergraduate Research - CUE	
CHEM 420	Cooperative Internship in Chemistry - WR, CUE	
CHEM 430	Practicum in Chemistry Education - CUE	
CHEM 491	Undergraduate Research - CUE	

Minimum Total Hours **50-51**

Chemistry Electives

Code	Title	Hours
CHEM 390	Undergraduate Research - WR, CUE	3
CHEM 391	Undergraduate Research - CUE	1-3
CHEM 392	Undergraduate Research - CUE	1-3
CHEM 420	Cooperative Internship in Chemistry - WR, CUE	1-3
CHEM 491	Undergraduate Research - CUE	1-3
CHEM 492	Undergraduate Research	1-3

CHEM 527	Spectroscopic Identification of Organic Compounds - WR	3
CHEM 528	Contemporary Methods of Organic Synthesis and Analysis - CUE	3
CHEM 529	Contemporary Methods of Inorganic Synthesis and Analysis - WR	3
CHEM 546	Biochemistry Laboratory	2
CHEM 547	Biochemistry II	3
CHEM 555	Theory and Application of Computational Chemistry	3
CHEM 557	Bio-Organic Phenomena	3

¹ Fulfills General Education requirement.

² CHEM 470 plus 3 semester hours of another WR course will fulfill the WR requirement.

³ With the consent of the instructor(s), graduate level courses in Chemistry may also be used to fulfill these requirements.

Flight Plan

Chemistry BS

Course	Title	Hours
Year 1		
Fall		
CHEM 201	General Chemistry I - S	3
CHEM 207	Introduction to Chemical Analysis I - SL	1
CHEM 208	Introduction to Chemical Analysis II - SL	1
GEN 100 or GEN 101	Student Success Center First Year Experience or Arts & Sciences First Year Experience	1
ENGL 101	Introduction to College Writing - WC	3
General Education: Cardinal Core Arts & Humanities - AH		3
General Education: Social & Behavioral Sciences and Historical Perspective (SBH)		3
Hours		15
Spring		
CHEM 202	General Chemistry II - S	3
CHEM 209	Introduction to Chemical Analysis III	1
CHEM 210	Introduction to Chemical Analysis IV	1
MATH 205	Calculus I - QR	4
ENGL 102	Intermediate College Writing - WC	3
General Education: Cardinal Core Oral Communication - OC		3
Hours		15
Year 2		
Fall		
CHEM 341	Organic Chemistry I	3
CHEM 343	Organic Chemistry Laboratory I	2
PHYS 221	Fundamentals of Physics I - S	3
PHYS 223	Fundamentals of Physics Lab I - SL	1
MATH 206	Calculus II	4
Foreign Language 1		3-4
Hours		16-17
Spring		
CHEM 342	Organic Chemistry II	3
CHEM 344	Organic Chemistry Laboratory II	2
PHYS 222	Fundamentals of Physics II - S	3
PHYS 224	Fundamentals of Physics Laboratory II - SL	1
MATH 301	Calculus III	4
Foreign Language 2		3-4
Hours		16-17

Year 3

Fall

CHEM 425	Instrumental and Statistical Analysis	3
CHEM 465	Physical Chemistry I	3
CHEM 426	Instrumental and Statistical Analysis Laboratory - WR	2
Chemistry Undergraduate Research or Co-Op		3
General Elective		3

Hours 14

Spring

Humanities or Social Science WR Elective (300 level or above)		3
CHEM 445 or CHEM 545	Survey of Biochemistry or Biochemistry I	3
CHEM 466	Physical Chemistry II	3
CHEM 470	Physical Chemistry Laboratory - WR	2
General Elective		3

Hours 14

Year 4

Fall

CHEM 515	Inorganic Chemistry	3
CHEM 527	Spectroscopic Identification of Organic Compounds - WR	3
Math, Physics, or Chemistry Elective (300 level or above)		3
Natural Science Elective (300 level or above)		3
General Education: Cardinal Core Social & Behavioral US Diversity - SBD1		3

Hours 15

Spring

CHEM 528	Contemporary Methods of Organic Synthesis and Analysis - CUE	2
CHEM 529	Contemporary Methods of Inorganic Synthesis and Analysis - WR	2
Humanities or Social Science Elective (300 level or above)		3
General Education: Cardinal Core Arts & Humanities Global Diversity - AHD2		3
General Elective		6

Hours 16

Minimum Total Hours 121-123

Track in Biochemistry

Course	Title	Hours
Year 1		
Fall		
CHEM 201	General Chemistry I - S	3
CHEM 207	Introduction to Chemical Analysis I - SL	1
CHEM 208	Introduction to Chemical Analysis II - SL	1
BIOL 240	Unity of Life - S	3
GEN 100 or GEN 101	Student Success Center First Year Experience or Arts & Sciences First Year Experience	1
ENGL 101	Introduction to College Writing - WC	3
General Education: Cardinal Core Arts & Humanities - AH		3
Hours		15
Spring		
CHEM 202	General Chemistry II - S	3
CHEM 209	Introduction to Chemical Analysis III	1
CHEM 210	Introduction to Chemical Analysis IV	1
BIOL 242	Diversity of Life - S	3
ENGL 102	Intermediate College Writing - WC	3
MATH 205	Calculus I - QR	4
Hours		15
Year 2		
Fall		
CHEM 341	Organic Chemistry I	3
CHEM 343	Organic Chemistry Laboratory I	2
BIOL 329	Cellular and Molecular Biology	3

PHYS 221	Fundamentals of Physics I - S	3
PHYS 223	Fundamentals of Physics Lab I - SL	1
MATH 206	Calculus II	4
Hours		16
Spring		
CHEM 342	Organic Chemistry II	3
CHEM 344	Organic Chemistry Laboratory II	2
PHYS 222	Fundamentals of Physics II - S	3
PHYS 224	Fundamentals of Physics Laboratory II - SL	1
MATH 301	Calculus III	4
General Education: Cardinal Core Arts & Humanities Global Diversity - AHD2		3
Hours		16
Year 3		
Fall		
CHEM 465	Physical Chemistry I	3
BIOL 330	Genetics and Molecular Biology	3
BIOL 331	Genetics and Molecular Biology: Laboratory	2
Chemistry Undergraduate Research or Co-op (CUE)		3
Foreign Language 1		3-4
Hours		14-15
Spring		
CHEM 466	Physical Chemistry II	3
CHEM 470	Physical Chemistry Laboratory - WR	2
General Education: Cardinal Core Social & Behavioral US Diversity - SBD1		3
General Education: Cardinal Core Oral Communication - OC		3
Foreign Language 2		3-4
Hours		14-15
Year 4		
Fall		
CHEM 425	Instrumental and Statistical Analysis	3
CHEM 545	Biochemistry I	3
CHEM 546	Biochemistry Laboratory	2
General Education: Social & Behavioral Sciences (SB) and Historical Perspective (SBH)		3
Humanities or Social Science WR Elective (300 level or above)		3
Hours		14
Spring		
CHEM 547	Biochemistry II	3
Chemistry Elective		3
Biology or Chemistry Elective		3
Humanities or Social Science Elective (300 level or above)		3
General Elective		3
Hours		15
Minimum Total Hours		119-121

Track in Business

Course	Title	Hours
Year 1		
Fall		
CHEM 201	General Chemistry I - S	3
CHEM 207	Introduction to Chemical Analysis I - SL	1
CHEM 208	Introduction to Chemical Analysis II - SL	1
ECON 201	Principles of Microeconomics - SB	3
GEN 100 or GEN 101	Student Success Center First Year Experience or Arts & Sciences First Year Experience	1
ENGL 101	Introduction to College Writing - WC	3
General Education: Cardinal Core Oral Communication - OC		3
Hours		15
Spring		
CHEM 202	General Chemistry II - S	3
CHEM 209	Introduction to Chemical Analysis III	1

CHEM 210	Introduction to Chemical Analysis IV	1
ECON 202	Principles of Macroeconomics - SB	3
MATH 205	Calculus I - QR	4
ENGL 102	Intermediate College Writing - WC	3
General Education: Social & Behavioral Sciences and Historical Perspective (SBH)		3
Hours		18
Year 2		
Fall		
CHEM 341	Organic Chemistry I	3
CHEM 343	Organic Chemistry Laboratory I	2
ACCT 201	Principles of Financial Accounting	3
MATH 206	Calculus II	4
PHYS 221	Fundamentals of Physics I - S	3
PHYS 223	Fundamentals of Physics Lab I - SL	1
Hours		16
Spring		
CHEM 342	Organic Chemistry II	3
CHEM 344	Organic Chemistry Laboratory II	2
ACCT 202	Principles of Managerial Accounting	3
CIS 250	Introduction to Data and Information Management	3
PHYS 222	Fundamentals of Physics II - S	3
PHYS 224	Fundamentals of Physics Laboratory II - SL	1
Hours		15
Year 3		
Fall		
CHEM 425	Instrumental and Statistical Analysis	3
CHEM 426	Instrumental and Statistical Analysis Laboratory - WR	2
CHEM 441 or CHEM 465	Elements of Physical Chemistry or Physical Chemistry I	3
CIS 300	Computer Information Systems	3
SOC 301 or PSYC 301 or BSTA 201	Introduction to Social Statistics or Statistics for Psychology or Business Statistics	3
Hours		14
Spring		
CHEM 445	Survey of Biochemistry	3
CHEM 470	Physical Chemistry Laboratory - WR	2
MGMT 301	Management and Organizational Behavior	3
Humanities or Social Science WR Elective (300 level or above)		3
Foreign Language 1		3-4
Hours		14-15
Year 4		
Fall		
CHEM 515	Inorganic Chemistry	3
CHEM 391 or CHEM 392 or CHEM 420 or CHEM 491	Undergraduate Research - CUE or Undergraduate Research - CUE or Cooperative Internship in Chemistry - WR, CUE or Undergraduate Research - CUE	1-3
MKT 301	Principles of Marketing	3
General Education: Cardinal Core Arts & Humanities Global Diversity - AHD2		3
Foreign Language 2		3-4
Hours		13-16
Spring		
Chemistry Elective (300 level or above)		2
General Education: Cardinal Core Arts & Humanities US Diversity - AHD1		3
FIN 301	Corporate Finance	3
Humanities or Social Science Elective (300 level or above)		3
Business Elective (300 level)		3
Hours		14
Minimum Total Hours		119-123

Degree Audit Report

Degree Audit reports illustrate how your completed courses fulfill the requirements of your academic plan. What-if reports allow you to compare the courses you have completed in your current academic plan to the courses required in another academic plan. Should you have questions about either report, please consult with your academic advisor.

To create either report:

1. Log into your ULink account.
2. Click on the Academic Progress tile.
3. Next, click on "View my Degree Audit" to run a Degree Audit report in the Undergraduate Advising area.
4. To create a What-if report, click on "Create a What-if Advisement Report."

Click here to run a Degree Audit report, or create a What-if report. (<https://ulink.louisville.edu>)

Flight Planner

Based on your major, the Flight Planner tool may be available for you to create a personalized Flight Plan. The Flight Planner can be found in the ULink Student Center. Consult with your advisor for assistance with the Flight Planner.