

# BIOCHEMISTRY (BS)

This program was approved for students entering the university in the Summer 2024–Spring 2025 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 Biochemistry

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

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

Academic Plan Code(s): BIOCBS

## Program Information

The BS in Biochemistry degree program is designed to provide an interdisciplinary curriculum in chemistry and biology and prepare students for careers in biochemistry and biotechnology.

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 ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ) <sup>1</sup>	31
	College/School Requirements	13-15
	Program/Major Requirements <sup>1</sup>	65
	Supporting Courses	16-18
	<b>Minimum Total Hours</b>	<b>121</b>

<sup>1</sup> 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.

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

## Departmental Admission Requirements

Admission to the major in Chemistry requires completion of CHEM 202 (<https://catalog.louisville.edu/search/?P=CHEM%20202>) (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 * *	31

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

CHEM 201	General Chemistry I - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
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CHEM 207	Introduction to Chemical Analysis I - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
MATH 205	Calculus I - QR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
PHYS 221	Fundamentals of Physics I - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
	or PHYS 295 Introductory Laboratories I - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )

\*This degree requires the completion of the University-wide General Education Program (link provided above). To complete the degree in the **minimum number of hours** listed on the Overview tab, some hours from the General Education Requirements must be satisfied by courses defined by the unit and/or program. If additional hours taken within the program also satisfy General Education requirements, students may need to take additional electives to satisfy the minimum hours required for the degree.

## College/School Requirements

Code	Title	Hours
<b>Arts &amp; Sciences Requirements</b>		
GEN 100	Student Success Center First Year Experience	1
or GEN 101	Arts & Sciences First Year Experience	
	Foreign Language <sup>1</sup>	6-8
ENGL 303	Scientific and Technical Writing - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
PHIL 321	Ethics	3
or PHIL 323	Medical Ethics	
or PHIL 325	Feminist Medical Ethics - AH ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ), D1 ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
or PHIL 328	Environmental Ethics	
	WR—two approved courses at the 300-level or above <sup>2,3</sup>	
	<b>Minimum Total Hours</b>	<b>13-15</b>

<sup>1</sup> Completion of the second semester of a single foreign language; hours will vary depending on language taken.

<sup>2</sup> Satisfies 3 credit hours of electives in Humanities or Social Sciences at the 300-level or above requirement; requirement is in addition to courses counted toward General Education.

<sup>3</sup> ENGL 303 and CHEM 470 satisfy the WR course requirements.

## Program/Major Requirements

Code	Title	Hours
<b>Departments of Chemistry and Biology</b>		
CHEM 201	General Chemistry I - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ) <sup>4</sup>	3
CHEM 202	General Chemistry II - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3

CHEM 207	Introduction to Chemical Analysis I - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ) <sup>4</sup>	1
CHEM 208	Introduction to Chemical Analysis II - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	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 441	Elements of Physical Chemistry	3
or CHEM 465	Physical Chemistry I	
CHEM 470	Physical Chemistry Laboratory - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ) <sup>3</sup>	2
CHEM 545	Biochemistry I	3
CHEM 546	Biochemistry Laboratory	2
CHEM 547	Biochemistry II	3
Undergraduate Research or Cooperative Internship <sup>5</sup>		3
BIOL 240	Unity of Life - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ) <sup>4</sup>	3
BIOL 242	Diversity of Life - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
BIOL 329	Cellular and Molecular Biology	3
BIOL 330	Genetics and Molecular Biology	3
BIOL 331	Genetics and Molecular Biology: Laboratory	2
BIOL 350	Biostatistics	3
CHEM/BIOL Electives - see table below (at least 3 hours in CHEM)		9

**Minimum Total Hours** **65**

Code	Title	Hours
<b>Chemistry/Biology Electives</b>		

(At least 3 hours must be in CHEM):

CHEM 426	Instrumental and Statistical Analysis Laboratory - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
CHEM 430	Practicum in Chemistry Education - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
CHEM 515	Inorganic Chemistry	
CHEM 527	Spectroscopic Identification of Organic Compounds - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
CHEM 528	Contemporary Methods of Organic Synthesis and Analysis - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
CHEM 529	Contemporary Methods of Inorganic Synthesis and Analysis - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
CHEM 555	Theory and Application of Computational Chemistry	
CHEM 557	Bio-Organic Phenomena	

BIOL 400	Histology	
BIOL 430	Undergraduate Teaching Assistant - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
BIOL 457	Microbiology	
or BIOL 485	Microbial Physiology - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ), CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
BIOL 458	Microbiology Laboratory	
BIOL 465	Principles of Physiology	
BIOL 541	Medicinal Plant Biochemistry - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ), CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
BIOL 542	Gene Structure and Function - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	

Code	Title	Hours
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**Supporting Courses**

MATH 205	Calculus I - QR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	4
MATH 206	Calculus II	4
Complete one of the following sequences:		8-10

Sequence 1:

PHYS 221	Fundamentals of Physics I - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
PHYS 222	Fundamentals of Physics II - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
PHYS 223	Fundamentals of Physics Lab I - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
PHYS 224	Fundamentals of Physics Laboratory II - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	

Sequence 2:

PHYS 295	Introductory Laboratories I - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
PHYS 296	Introductory Laboratories II - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
PHYS 298	Introductory Mechanics, Heat and Sound - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	
PHYS 299	Introductory Electricity, Magnetism and Light	

**Minimum Total Hours** **16-18**

Code	Title	Hours
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**Culminating Undergraduate Experience (Graduation requirement):**

Requirement fulfilled by completing one of the following:

CHEM 390	Undergraduate Research - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ), CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
CHEM 391	Undergraduate Research - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
CHEM 392	Undergraduate Research - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
CHEM 420	Cooperative Internship in Chemistry - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ), WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
CHEM 430	Practicum in Chemistry Education - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
CHEM 491	Undergraduate Research - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
CHEM 528	Contemporary Methods of Organic Synthesis and Analysis - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
BIOL 405	Undergraduate Research - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
BIOL 406	Undergraduate Research (WR) - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ), CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
BIOL 430	Undergraduate Teaching Assistant - CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
BIOL 485	Microbial Physiology - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ), CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )
BIOL 541	Medicinal Plant Biochemistry - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> ), CUE ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )

### Flight Plan

Year 1		Hours
Fall		
CHEM 201	General Chemistry I - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
CHEM 207	Introduction to Chemical Analysis I - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	1
CHEM 208	Introduction to Chemical Analysis II - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	1
BIOL 240	Unity of Life - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	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 ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
General Education: Cardinal Core Arts & Humanities – AH		3
<b>Hours</b>		<b>15</b>
<b>Spring</b>		
CHEM 202	General Chemistry II - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
CHEM 209	Introduction to Chemical Analysis III	1
CHEM 210	Introduction to Chemical Analysis IV	1
BIOL 242	Diversity of Life - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
ENGL 102	Intermediate College Writing - WC ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
MATH 205	Calculus I - QR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	4
<b>Hours</b>		<b>15</b>
<b>Year 2</b>		
<b>Fall</b>		
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 ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
PHYS 223	Fundamentals of Physics Lab I - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	1
MATH 206	Calculus II	4
<b>Hours</b>		<b>16</b>
<b>Spring</b>		
CHEM 342	Organic Chemistry II	3
CHEM 344	Organic Chemistry Laboratory II	2
PHYS 222	Fundamentals of Physics II - S ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
PHYS 224	Fundamentals of Physics Laboratory II - SL ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	1
BIOL 330	Genetics and Molecular Biology	3
BIOL 331	Genetics and Molecular Biology: Laboratory	2
<b>Hours</b>		<b>14</b>
<b>Year 3</b>		
<b>Fall</b>		
CHEM 545	Biochemistry I	3
CHEM 546	Biochemistry Laboratory	2
PHIL 321	Ethics	3
BIOL 350	Biostatistics	3
General Education: Cardinal Core Oral Communication - OC		3
General Education: Cardinal Core Arts & Humanities Global Diversity - AHD2		3
<b>Hours</b>		<b>17</b>
<b>Spring</b>		
CHEM 547	Biochemistry II	3
CHEM 441	Elements of Physical Chemistry	3
CHEM 470	Physical Chemistry Laboratory - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	2
General Education: Cardinal Core Social & Behavioral Historical Perspective - SBH		3
Free Elective		3
<b>Hours</b>		<b>14</b>

**Year 4**

**Fall**

CHEM 425	Instrumental and Statistical Analysis	3
Undergraduate Research or Cooperative Internship		3
CHEM/BIOL elective		3
ENGL 303	Scientific and Technical Writing - WR ( <a href="http://catalog.louisville.edu/undergraduate/general-education-requirements/">http://catalog.louisville.edu/undergraduate/general-education-requirements/</a> )	3
Foreign Language 1		3-4
<b>Hours</b>		<b>15-16</b>

**Spring**

CHEM/BIOL elective		3
CHEM/BIOL elective		3
General Education: Cardinal Core Social & Behavioral US Diversity - SBD1		3
Free Elective		3
Foreign Language 2		3-4
<b>Hours</b>		<b>15-16</b>
<b>Minimum Total Hours</b>		<b>121-123</b>

The Flight Plan outlined above is intended to demonstrate one possible path to completing the degree within four years. Course selection and placement within the program may vary depending on course offerings and schedule, elective preferences, and other factors (study abroad, internship availability, etc.). Please consult your advisor for additional information about building a flight plan that works for you.

**Degree Audit Report**

Degree Audit reports illustrate how your completed courses fulfill the requirements of your academic plan, and which requirements are still outstanding. Degree audits also take transfer credits and test credits into account. "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.

**Flight Planner**

The Flight Planner tool is available for you to create a personalized Flight Plan to graduation. Advisors have access to review your Flight Planner and can help you adjust it to ensure you remain on track to graduate in a timely manner.

**To create these reports:**

- a. Log into your ULink account.
- b. Click on the Academic Progress tile.
- c. Select the appropriate report.
  - i. To run a Degree Audit report, click on "View my Degree Audit."
  - ii. To create a What-if report, click on "Create a What-if Advisement Report."
  - iii. To run a Flight Planner report, click on "Use My Flight Planner."

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