

MATHEMATICS (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 Mathematics

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

Department: Mathematics (<https://louisville.edu/math/>)

Academic Plan Code(s): MATHBS, MATHBS_ACS

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 |
| | (7-10 hours of General Education requirements may be satisfied through coursework required by the degree program) | |
| | College/School Requirements ¹ | 13-15 |
| | Program/Major Requirements ¹ | 51 |
| | Supporting Courses ¹ | 24-26 |
| | Minimum Total Hours | 121 |

Track in Actuarial Science

| Code | Title | Hours |
|------|---|----------------|
| | General Education Requirements (http://catalog.louisville.edu/undergraduate/general-education-requirements/) ¹ | 31 |
| | (7-10 hours of General Education requirements may be satisfied through coursework required by the degree program) | |
| | College/School Requirements ¹ | 13-15 |
| | Track Requirements ¹ | 45 |
| | Supporting Courses | 30-33 |
| | Minimum Total Hours | 121-122 |

¹ Some courses required in this degree program satisfy multiple requirements. **To complete the degree 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.** Using other courses to satisfy General Education requirements will require

additional hours to complete the degree requirements. See the Degree Requirements and/or Track tabs for specific coursework.

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

Accelerated BA-BS/MA Option in Mathematics

Mathematics majors who are considering pursuing a master’s degree (MA) in Mathematics can speed up the process by applying some of their undergraduate credit hours toward a master’s degree. Students accepted into the Accelerated BA-BS/MA take 9-12 credit hours (depending on the graduate option selected) as an undergraduate that apply toward both the the bachelor’s degree and the the eventual master’s degree.

Interested students must apply to the program during their Junior year (i.e., when they have accumulated 60-90 hours of credit). Applicants must have completed MATH 205, MATH 206, MATH 301, and MATH 325, or equivalent courses, prior to application. Applicants must have a minimum overall GPA of 3.5, and minimum GPA of 3.66 in mathematics courses.

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 149-152 credits are required for the dual degrees: 122-125 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 BS in Mathematics requires enrollment in a mathematics course beyond MATH 205; a minimum cumulative grade point average of 2.0; and a minimum grade point average of 2.0 on all courses in the major.

The Change Major Request form can be found under the Academic Progress tile on ULink.

Accelerated BA/BS-MA Option in Mathematics

Students must apply for admission to the program no later than the end of the junior year and must have completed

MATH 205, MATH 206, MATH 301, and MATH 325, or equivalent courses, prior to application.

Applicants must have a minimum overall GPA of 3.5, and minimum GPA of 3.66 in mathematics courses.

General Education Requirements

| Code | Title | Hours |
|---|--|-------|
| General Education Requirements (http://catalog.louisville.edu/undergraduate/general-education-requirements/) ¹ | | 31 |
| The following courses are required by the program and satisfy the respective General Education Requirement(s): | | |
| MATH 205 | Calculus I - QR (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| PHYS 298 | Introductory Mechanics, Heat and Sound - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| | or CHEM 201 General Chemistry I - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| | or BIOL 240 Unity of Life - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| PHYS 295 | Introductory Laboratories I - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| | or CHEM 207 Introduction to Chemical Analysis I - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| | or BIOL 241 Unity of Life Lab - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |

All degrees require 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.

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 ² | | 6-8 |
| Electives in Humanities or Social Sciences, at the 300 level or above ³ | | 6 |
| WR—two approved courses at the 300 level or above ⁴ | | |
| Minimum Total Hours | | 13-15 |

Program/Major Requirements

Course requirements for the track in Actuarial Science can be found on the Track Requirements tab.

| Code | Title | Hours |
|--|--|-------|
| Mathematics Department ^{5,6} | | |
| MATH 205 | Calculus I - QR (http://catalog.louisville.edu/undergraduate/general-education-requirements/) ⁷ | 4 |
| MATH 206 | Calculus II | 4 |
| MATH 301 | Calculus III | 4 |
| MATH 311 | Introduction to Higher Math | 3 |

| | | |
|---|--|----|
| MATH 325 | Introduction to Linear Algebra | 3 |
| MATH 387 | Discrete Mathematics | 3 |
| MATH 405 | Differential Equations | 3 |
| MATH 501 | Introduction to Analysis I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| MATH 502 | Introduction to Analysis II | 3 |
| MATH 521 | Modern Algebra I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| MATH 522 | Modern Algebra II | 3 |
| MATH 561 | Probability | 3 |
| Select four courses from the following: | | 12 |
| MATH 360 | Statistical Data Analysis - WR (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| MATH 407 | Numerical Analysis | |
| MATH 505 | Introduction to Partial Differential Equations | |
| MATH 507 | Fourier Analysis | |
| MATH 511 | Complex Analysis I | |
| MATH 512 | Complex Analysis II | |
| MATH 535 | Modeling I | |
| MATH 536 | Modeling II | |
| MATH 550 | Advanced Euclidean Geometry | |
| MATH 551 | Geometry | |
| MATH 562 | Mathematical Statistics | |
| MATH 581 | Introduction to Graph Theory | |

Minimum Total Hours 51

| Code | Title | Hours |
|---|--|-------|
| Supporting Courses | | |
| Select one of the following sequences: ⁷ | | 8-10 |
| Sequence One: | | |
| PHYS 298 | Introductory Mechanics, Heat and Sound - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| PHYS 299 | Introductory Electricity, Magnetism and Light | |
| PHYS 295 | Introductory Laboratories I - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| PHYS 296 | Introductory Laboratories II - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| Sequence Two: | | |
| CHEM 201 | General Chemistry I - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| CHEM 202 | General Chemistry II - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| CHEM 207 | Introduction to Chemical Analysis I - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |

| | | |
|--|---|--------------|
| CHEM 208 | Introduction to Chemical Analysis II - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| CHEM 209 | Introduction to Chemical Analysis III | |
| Sequence Three: | | |
| BIOL 240 | Unity of Life - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| BIOL 241 | Unity of Life Lab - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| BIOL 242 | Diversity of Life - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| BIOL 243 | Diversity of Life Lab - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| Elective in second science discipline ⁷ | | 3 |
| CSE 130 | Introduction to C and C++ Programming Languages | 3 |
| Elective in Natural Sciences (other than Mathematics) ⁹ | | 3 |
| Minimum Electives ¹⁰ | | 5-9 |
| Minimum Total Hours | | 24-26 |

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

Program/Major requirements and Supporting Courses for Track in Actuarial Science are articulated on the Track Requirements tab.

| Code | Title | Hours |
|--|--|-------|
| Culminating Undergraduate Experience (Graduation requirement) | | |
| Requirement fulfilled by completing: | | |
| MATH 501 | Introduction to Analysis I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| | or MATH 521 Modern Algebra I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |

- ¹ Ten (10) hours of General Education requirements (Quantitative Reasoning and Natural Sciences) are met with requirements in the major or supporting coursework.
- ² Completion of the second semester of a single foreign language; hours will vary depending on the language taken
- ³ In addition to courses counted toward General Education
- ⁴ May be incorporated into other degree requirements
- ⁵ Mathematics courses at the 100 level do not count toward hours in the major.
- ⁶ A minimum of 12 hours in courses numbered 311 or higher must be successfully completed in the Department of Mathematics at the University of Louisville.
- ⁷ Fulfills General Education requirement.
- ⁸ Or another computer related course chosen in consultation with the departmental advisor
- ⁹ Or a second computer related course chosen in consultation with departmental advisor
- ¹⁰ Elective hours are dependent on completion of at least 10 hours of General Education requirements through requirements in the major, track and/or supporting coursework

Track Requirements Track in Actuarial Science

| Code | Title | Hours |
|--|--|-------|
| Mathematics Department ^{1,2} | | |
| MATH 205 | Calculus I - QR (http://catalog.louisville.edu/undergraduate/general-education-requirements/) ³ | 4 |
| MATH 206 | Calculus II | 4 |
| MATH 301 | Calculus III | 4 |
| MATH 311 | Introduction to Higher Math | 3 |
| MATH 325 | Introduction to Linear Algebra | 3 |
| MATH 360 | Statistical Data Analysis - WR (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| MATH 372 | Theory of Interest | 3 |
| MATH 387 | Discrete Mathematics | 3 |
| MATH 405 | Differential Equations | 3 |
| MATH 501 | Introduction to Analysis I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| MATH 561 | Probability | 3 |
| MATH 562 | Mathematical Statistics | 3 |
| MATH 570 | Foundations of Actuarial Science | 3 |
| MATH 521 | Modern Algebra I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| | or MATH 573 Actuarial Models I | |

Minimum Total Hours **45**

| Code | Title | Hours |
|---|--|-------|
| Supporting Courses | | |
| Select one of the following sequences: ³ | | 4-5 |
| Sequence One: | | |
| PHYS 298 | Introductory Mechanics, Heat and Sound - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| PHYS 295 | Introductory Laboratories I - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| Sequence Two: | | |
| CHEM 201 | General Chemistry I - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| CHEM 207 | Introduction to Chemical Analysis I - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| Sequence Three: | | |
| BIOL 102 | Biology: Current Issues and Applications - S (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| BIOL 104 | Laboratory for Biology: Current Issues and Applications - SL (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | |
| Elective in second science discipline ³ | | 3 |

| | | |
|----------------------------|---|--------------|
| ECON 201 | Principles of Microeconomics - SB (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| ECON 202 | Principles of Macroeconomics - SB (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| CIS 305 | Data Analysis for Decision-Making | 3 |
| FIN 301 | Corporate Finance ⁴ | 3 |
| FIN 401 | Investments ⁴ | 3 |
| FIN 403 | Financial Derivatives ⁴ | 3 |
| FIN 433 | Financial Markets and Institutions ^{4, 5} | 3 |
| Minimum Electives | | 2-4 |
| Minimum Total Hours | | 30-33 |

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

- ¹ Mathematics courses at the 100 level do not count toward hours in the major.
- ² A minimum of 12 hours in courses numbered 311 or higher must be successfully completed in the Department of Mathematics at the University of Louisville.
- ³ Fulfills General Education requirement
- ⁴ Students need to contact the College of Business for permission to enroll in these courses.
- ⁵ FIN 433 can be used as an elective in Humanities or Social Sciences at the 300+ level.

Flight Plan

Mathematics

| Year 1 | | Hours |
|--|--|--------------|
| Fall | | |
| 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 (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| MATH 205 | Calculus I - QR (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 4 |
| General Education: Cardinal Core Oral Communication - OC | | 3 |
| General Elective | | 3 |
| Hours | | 14 |
| Spring | | |
| ENGL 102 | Intermediate College Writing - WC (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| General Education: Cardinal Core Arts & Humanities - AH | | 3 |
| Foreign Language 1 | | 3-4 |
| MATH 206 | Calculus II | 4 |
| MATH 311 | Introduction to Higher Math | 3 |
| Hours | | 16-17 |
| Year 2 | | |
| Fall | | |
| General Education: Cardinal Core Arts & Humanities Global Diversity - AHD2 | | 3 |
| General Elective | | 3 |
| Foreign Language 2 | | 3-4 |
| MATH 301 | Calculus III | 4 |

| | | |
|--|---|----------------|
| MATH 325 | Introduction to Linear Algebra | 3 |
| Hours | | 16-17 |
| Spring | | |
| General Education: Cardinal Core Social & Behavioral Sciences US Diversity - SBD1 | | 3 |
| General Education: Cardinal Core Social & Behavioral Sciences Historical Perspective - SBH | | 3 |
| Humanities or Social Science WR Elective (300 level or above) | | 3 |
| Math Elective | | 3 |
| MATH 405 | Differential Equations | 3 |
| Hours | | 15 |
| Year 3 | | |
| Fall | | |
| Humanities or Social Science WR Elective (300 level or above) | | 3 |
| MATH 387 | Discrete Mathematics | 3 |
| MATH 501 or MATH 521 | Introduction to Analysis I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) or Modern Algebra I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| MATH 561 | Probability | 3 |
| First portion of chosen Natural Science sequence | | 3-5 |
| Hours | | 15-17 |
| Spring | | |
| Second portion of chosen Natural Science sequence (also fulfills portion of Gen Ed Natural Science requirement - S/SL/B) | | 4-5 |
| Natural Science Elective (not from chosen sequence) (also fulfills portion of Gen Ed Natural Science requirement - S) | | 3 |
| Math Elective | | 3 |
| MATH 502 or MATH 522 | Introduction to Analysis II or Modern Algebra II | 3 |
| CSE 130 | Introduction to C and C++ Programming Languages | 3 |
| Hours | | 16-17 |
| Year 4 | | |
| Fall | | |
| MATH 521 or MATH 501 | Modern Algebra I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) or Introduction to Analysis I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| Math Elective | | 3 |
| General Elective | | 3 |
| General Elective (300 level or above) | | 3 |
| Natural Science Elective (non-Math) or second computer-related course | | 3 |
| Hours | | 15 |
| Spring | | |
| MATH 522 or MATH 502 | Modern Algebra II or Introduction to Analysis II | 3 |
| Math Elective | | 3 |
| General Elective | | 3 |
| General Elective | | 3 |
| General Elective (if needed) | | 3 |
| Hours | | 15 |
| Minimum Total Hours | | 122-127 |

Mathematics, track in Actuarial Science

| Year 1 | | Hours |
|-----------------------|--|-------|
| Fall | | |
| 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 (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| General Education: Cardinal Core Oral Communication - OC | | 3 |
| MATH 205 | Calculus I - QR (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 4 |
| ECON 201 | Principles of Microeconomics - SB (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| ACCT 201 | Principles of Financial Accounting | 3 |
| Hours | | 17 |

Spring

| | | |
|--------------|---|-----------|
| ENGL 102 | Intermediate College Writing - WC (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| MATH 206 | Calculus II | 4 |
| MATH 311 | Introduction to Higher Math | 3 |
| ECON 202 | Principles of Macroeconomics - SB (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| ACCT 202 | Principles of Managerial Accounting | 3 |
| Hours | | 16 |

Year 2

Fall

| | | |
|--|--------------------------------|-----------|
| General Education: Cardinal Core Arts & Humanities Global Diversity - AHD2 | | 3 |
| Foreign Language 1 | | 3-4 |
| MATH 301 | Calculus III | 4 |
| MATH 325 | Introduction to Linear Algebra | 3 |
| Hours | | 14 |

Spring

| | | |
|--------------------|----------------------|-----------|
| Foreign Language 2 | | 3-4 |
| MATH 372 | Theory of Interest | 3 |
| MATH 387 | Discrete Mathematics | 3 |
| MATH 561 | Probability | 3 |
| FIN 301 | Corporate Finance | 3 |
| Hours | | 16 |

Year 3

Fall

| | | |
|--|----------------------------------|-----------|
| General Education: Cardinal Core Social & Behavioral Sciences Historical Perspective - SBH | | 3 |
| MATH 562 | Mathematical Statistics | 3 |
| MATH 570 | Foundations of Actuarial Science | 3 |
| FIN 401 | Investments | 3 |
| General Elective | | 3 |
| Hours | | 15 |

Spring

| | | |
|--|------------------------------------|--------------|
| General Education: Cardinal Core Arts & Humanities US Diversity - AHD1 | | 3 |
| Chosen Natural Science Sequence (lecture & lab) | | 4-5 |
| MATH 405 | Differential Equations | 3 |
| FIN 433 | Financial Markets and Institutions | 3 |
| Hours | | 13-14 |

Year 4

Fall

| | | |
|---|--|-----------|
| MATH 360 | Statistical Data Analysis - WR (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| MATH 501 | Introduction to Analysis I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) | 3 |
| General Elective | | 3 |
| General Elective | | 3 |
| Humanities or Social Science WR Elective (300 level or above) | | 3 |
| Hours | | 15 |

Spring

| | | |
|---|--|----------------|
| MATH 521 or MATH 573 | Modern Algebra I - CUE (http://catalog.louisville.edu/undergraduate/general-education-requirements/) or Actuarial Models I | 3 |
| CIS 305 | Data Analysis for Decision-Making | 3 |
| FIN 403 | Financial Derivatives | 3 |
| Natural Science Elective (outside of chosen Natural Science sequence) | | 3 |
| Humanities or Social Science WR Elective (300 level or above) | | 3 |
| Hours | | 15 |
| Minimum Total Hours | | 121-122 |

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>)