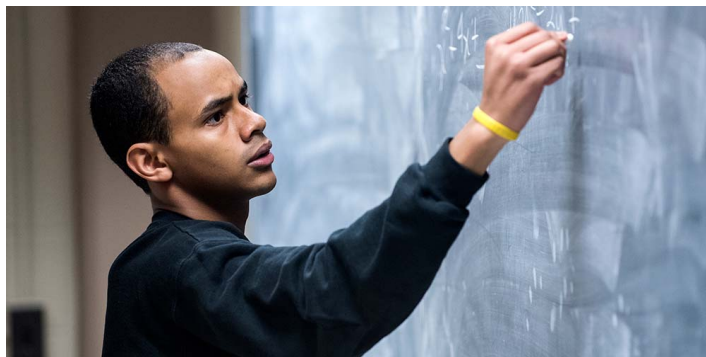


# MATHEMATICS (BS)



This program was approved for students entering the university in the Summer 2018–Spring 2019 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 (MATHBS)

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

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

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
	(7-10 hours of General Education requirements may be satisfied through coursework required by the degree program)	
	College/School Requirements <sup>1</sup>	13-15
	Program/Major Requirements <sup>1</sup>	68-70
	Track Requirements <sup>1</sup>	22-23
	Minimum Total Hours	122-125

<sup>1</sup> 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

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. As part of the combined degree, students must complete MATH 405 and at least four (4) of the

following: MATH 501, MATH 502, MATH 521, MATH 522, MATH 561, MATH 562, or MATH 581, including at least one sequence from among these courses.

The student may take a maximum of nine (9) credit hours for graduate credit, which will also apply to the requirements for the baccalaureate degree in Mathematics. All 600-level courses numbered 689 or below qualify, as do 500-level courses when completed in accord with the stipulations for graduate credit outlined in the syllabus.

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

## General Education Requirements

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
	The following courses are required by the program and satisfy the respective General Education Requirement(s):	
MATH 205	Calculus I - QR	
PHYS 298	Introductory Mechanics, Heat and Sound - S or CHEM 201 General Chemistry I - S or BIOL 240 Unity of Life - S	
PHYS 295	Introductory Laboratories I - SL or CHEM 207 Introduction to Chemical Analysis I - SL or BIOL 244 Principles of Biology Laboratory - SL	

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
<b>Arts &amp; Sciences Requirements</b>		
GEN 100	Student Success Center Orientation	1
or GEN 101	Arts and Sciences Orientation	
Foreign Language <sup>2</sup>		6-8
Electives in Humanities or Social Sciences, at the 300 level or above <sup>3</sup>		6
WR—two approved courses at the 300 level or above <sup>4</sup>		
Minimum Total Hours		13-15

## Program/Major Requirements

Code	Title	Hours
<b>Mathematics Department</b> <sup>5,6</sup>		
MATH 205	Calculus I - QR <sup>7</sup>	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	3
MATH 502	Introduction to Analysis II	3
MATH 521	Modern Algebra I - CUE	3
MATH 522	Modern Algebra II	3
MATH 561	Probability	3
Select four courses from the following:		12
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	

### Supporting Courses

Select one of the following sequences: <sup>7</sup>		8-10
Sequence One:		
PHYS 298	Introductory Mechanics, Heat and Sound - S	
PHYS 299	Introductory Electricity, Magnetism and Light	
PHYS 295	Introductory Laboratories I - SL	
PHYS 296	Introductory Laboratories II - SL	
Sequence Two:		
CHEM 201	General Chemistry I - S	
CHEM 202	General Chemistry II - S	
CHEM 207	Introduction to Chemical Analysis I - SL	
CHEM 208	Introduction to Chemical Analysis II - SL	

CHEM 209	Introduction to Chemical Analysis III	
Sequence Three:		
BIOL 240	Unity of Life - S	
BIOL 242	Diversity of Life	
BIOL 244	Principles of Biology Laboratory - SL	
Elective in second science discipline <sup>7</sup>		3
CECS 130	Introduction to Programming Languages <sup>8</sup>	3
Elective in Natural Sciences (other than Mathematics) <sup>9</sup>		3
Minimum Electives <sup>10</sup>		0
Minimum Total Hours		68-70

Only 60 hours in the major department may be applied toward the Bachelor of Science degree.

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
<b>Culminating Undergraduate Experience (Graduation requirement)</b>		

Requirement fulfilled by completing:

- |             |                                  |  |
|-------------|----------------------------------|--|
| MATH 501    | Introduction to Analysis I - CUE |  |
| or MATH 521 | Modern Algebra I - CUE           |  |
- Ten (10) hours of General Education requirements (Quantitative Reasoning and Natural Sciences) are met with requirements in the major or supporting coursework.
  - Completion of the second semester of a single foreign language; hours will vary depending on the language taken
  - In addition to courses counted toward General Education
  - May be incorporated into other degree requirements
  - Mathematics courses at the 100 level do not count toward hours in the major.
  - 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.
  - Fulfills General Education requirement.
  - Or another computer related course chosen in consultation with the departmental advisor
  - Or a second computer related course chosen in consultation with departmental advisor
  - 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
<b>Mathematics Department</b> <sup>1,2</sup>		
MATH 205	Calculus I - QR <sup>3</sup>	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 372	Theory of Interest	3
MATH 387	Discrete Mathematics	3
MATH 405	Differential Equations	3
MATH 501	Introduction to Analysis I - CUE	3
MATH 560	Statistical Data Analysis - WR	3
MATH 561	Probability	3
MATH 562	Mathematical Statistics	3
MATH 570	Foundations of Actuarial Science	3
MATH 573	Actuarial Models I	3
<b>Supporting Courses</b>		
Select one of the following sequences: <sup>3</sup>		4-5
Sequence One:		
PHYS 298	Introductory Mechanics, Heat and Sound - S	
PHYS 295	Introductory Laboratories I - SL	
Sequence Two:		
CHEM 201	General Chemistry I - S	
CHEM 207	Introduction to Chemical Analysis I - SL	
Sequence Three:		
BIOL 102	Biology: Current Issues and Applications - S	
BIOL 104	Laboratory for Biology: Current Issues and Applications - SL	
Elective in second science discipline <sup>3</sup>		3
CIS 300	Computer Information Systems <sup>4</sup>	3
ECON 380	Introduction to Econometrics <sup>4</sup>	3
FIN 301	Corporate Finance <sup>4</sup>	3
FIN 401	Investments <sup>4</sup>	3
Minimum Total Hours		64-65

- <sup>1</sup> Mathematics courses at the 100 level do not count toward hours in the major.
- <sup>2</sup> 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.
- <sup>3</sup> Fulfills General Education requirement
- <sup>4</sup> Students must be admitted to the College of Business prior to enrollment in these courses

Only 60 hours in the major department may be applied toward the Bachelor of Science degree.

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

## Flight Plan

### Mathematics

Course	Title	Hours
<b>Year 1</b>		
<b>Fall</b>		
GEN 100 or GEN 101	Student Success Center Orientation or Arts and Sciences Orientation	1
ENGL 101	Introduction to College Writing - WC	3
MATH 205	Calculus I - QR	4
General Education: Cardinal Core Oral Communication - OC		3
General Elective		3
Hours		14

<b>Spring</b>		
ENGL 102	Intermediate College Writing - WC	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
<b>Year 2</b>		
<b>Fall</b>		
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
<b>Spring</b>		
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
<b>Year 3</b>		
<b>Fall</b>		
Humanities or Social Science WR Elective (300 level or above)		3
MATH 387	Discrete Mathematics	3
MATH 501	Introduction to Analysis I - CUE or MATH 521 or Modern Algebra I - CUE	3
MATH 561	Probability	3
First portion of chosen Natural Science sequence		3-5
Hours		15-17
<b>Spring</b>		
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
CECS 130	Introduction to Programming Languages	3
Hours		16-17
<b>Year 4</b>		
<b>Fall</b>		
MATH 521 or MATH 501	Modern Algebra I - CUE or Introduction to Analysis I - CUE	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
<b>Spring</b>		
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 with a Track in Actuarial Science

Course	Title	Hours
<b>Year 1</b>		
<b>Fall</b>		
GEN 100 or GEN 101	Student Success Center Orientation or Arts and Sciences Orientation	1
ENGL 101	Introduction to College Writing - WC	3
General Education: Cardinal Core Oral Communication - OC		3
MATH 205	Calculus I - QR	4
ECON 201	Principles of Microeconomics - SB	3
ACCT 201	Principles of Financial Accounting	3
Hours		17
<b>Spring</b>		
ENGL 102	Intermediate College Writing - WC	3
MATH 206	Calculus II	4
MATH 311	Introduction to Higher Math	3
ECON 202	Principles of Macroeconomics - SB	3
ACCT 202	Principles of Managerial Accounting	3
Hours		16
<b>Year 2</b>		
<b>Fall</b>		
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		13-14
<b>Spring</b>		
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		15-16
<b>Year 3</b>		
<b>Fall</b>		
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
<b>Spring</b>		
General Education: Cardinal Core Arts & Humanities US Diversity - AHD1		3
Chosen Natural Science Sequence (lecture & lab)		4-5
MATH 405	Differential Equations	3
FIN 414	Applied Financial Econometrics	3
Finance Minor Course		3
Hours		16-17
<b>Year 4</b>		
<b>Fall</b>		
MATH 560	Statistical Data Analysis - WR	3
MATH 501	Introduction to Analysis I - CUE	3
Finance Minor Course		3
Finance Minor Course		3
Humanities or Social Science WR Elective (300 level or above)		3
Hours		15
<b>Spring</b>		
MATH 573	Actuarial Models I	3
CIS 300	Computer Information Systems	3
ECON 380	Introduction to Econometrics	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	122-125

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. For both reports, please consult with your advisor before editing your course schedule.

### To create either report:

1. Log into your ULink account.
2. Click on the Student Services tab.
3. Next, click on "View my Academic Advisement Report" 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>)