

MATHEMATICS (BS/MS)

The accelerated BS/MS program in Mathematics gives academically successful Loyola undergraduates the opportunity to pursue the MS degree in Mathematics while completing their BS degree. This is best suited for students pursuing a BS in mathematics, but can be pursued with other BS degrees (<http://www.luc.edu/math/undergradprogs.shtml/>) offered by the Department of Mathematics and Statistics at the program director's discretion.

There are several advantages to pursuing the BS/MS program. Chief among them are time and cost: by taking graduate courses during their senior year (at the undergraduate tuition rate), students in the BS/MS program save one semester over the usual path to a Master's degree. Additionally, students in the STEM fields holding an MS degree are more competitive for jobs.

STEM DESIGNATION

The MS in Mathematics has been granted a STEM designation from the U.S. Department of Homeland Security. International students completing degrees with this designation can qualify for extended OPT (Optional Practical Training), bringing the total OPT time granted to 36 months.

CURRICULUM

(Effective Fall 2023)

Requirements for Completion of the BS/MS Program

The following are required to complete the BS/MS degree program in Mathematics:

- Successful completion of one of the BS degrees (<https://catalog.luc.edu/undergraduate/arts-sciences/mathematics-statistics/#academicstext>) in the Department of Mathematics and Statistics.
- Successful completion of the 30-credit MS degree in Mathematics (detailed below) with a GPA of 3.0 or higher.
- Completion of all BS degree requirements at least one semester before completing the MS degree.

After admission to the BS/MS program, students may take the Graduate Seminar, MATH 401 Introduction to Graduate Study in Mathematics, and up to three 400-level mathematics or statistics courses during their senior year. The three 400-level courses may be applied both toward the BS degree (in place of corresponding 300-level courses) and toward the MS degree. This leaves 20 credit hours to complete over the student's final year in the program.

Further Information

If you have additional questions about the program, please contact Dr. Aaron Lauve (<https://catalog.luc.edu/faculty/>), Graduate Program Director for Mathematics.

The MS Degree in Mathematics (30 Credits)

The coursework includes required ("foundational") courses in algebra, analysis and statistics, as well as 18 credit hours of electives, chosen from courses in Mathematics and cognate fields (such as Applied Statistics, Data Science and Computer Science). With their practicum, students design and independently carry out a research project under faculty supervision.

Code	Title	Hours
Foundational Requirements		
MATH 416	Survey of Algebra	3
MATH 454	Survey of Analysis	3
STAT 404	Probability & Statistics I	3
or STAT 408	Applied Regression Analysis	
Depth Requirements		
A second course in algebra or analysis chosen from:		3
MATH 414	Algebra II	
MATH 415	Topics in Linear Algebra	
MATH 452	Analysis II	
MATH 453	Complex Analysis	
A second course in statistics or a cognate field chosen from:		3
STAT 404	Probability & Statistics I	
STAT 405	Probability & Statistics II	
STAT 408	Applied Regression Analysis	
STAT 410	Categorical Data Analysis	
COMP 429	Natural Language Processing	
COMP 487	Deep Learning	
DSCI 401	Introduction to Data Science	
Or courses in other programs, with approval		
Additional Requirements		
MATH 401	Introduction to Graduate Study in Mathematics	1
MATH 495	Graduate Practicum in Mathematics	2
Mathematics & Statistics Electives		
Four electives chosen from Mathematics and approved Statistics courses at the 400 level. ¹		12
Total Hours		30
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STAT 405	Probability & Statistics II	
STAT 408	Applied Regression Analysis	
STAT 410	Categorical Data Analysis	
COMP 429	Natural Language Processing	
COMP 487	Deep Learning	
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Total Hours	30
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¹ A list of possible elective courses may be found here (<https://catalog.luc.edu/course-descriptions/math/>) and here (<https://catalog.luc.edu/course-descriptions/stat/>).

Guidelines for Accelerated Bachelor's/Master's Programs

Terms

- **Accelerated Bachelor's/Master's programs:** In this type of program, students share limited credits between their undergraduate and graduate degrees to facilitate completion of both degrees.
- **Shared credits:** Graduate level credit hours taken during the undergraduate program and then applied towards graduate program requirements will be referred to as Shared credits.

Admission Requirements

Accelerated Bachelor's/Master's programs are designed to enhance opportunities for advanced training for Loyola's undergraduates. Admission to these programs must be competitive and will depend upon a positive review of credentials by the program's admissions committee. Accordingly, the admission requirements for these programs may be higher than those required if the master's degree were pursued entirely after the receipt of a bachelor's degree. That is, programs may choose to have more stringent admissions requirements in addition to those minimal requirements below.

Requirements:

- Declared appropriate undergraduate major,
- By the time students begin taking graduate courses as an undergraduate, the student has completed approximately 90 credit hours, or the credit hours required in a program that is accredited by a specialty organization,¹
- A minimum cumulative GPA for coursework at Loyola that is at or above the program-specific requirements, a minimum major GPA that is at or above the program-specific requirements, and/or appropriate designated coursework for evaluation of student readiness in their discipline.²

Students not eligible for the Accelerated Bachelor's/Master's program (e.g., students who have not declared the appropriate undergraduate major) may apply to the master's program through the regular admissions process. Students enrolled in an Accelerated Bachelor's/Master's program who choose not to continue to the master's degree program upon completion of the bachelor's degree will face no consequences.³

Ideally, a student will apply for admission (or confirm interest in proceeding towards the graduate degree in opt-out programs) as they approach 90 credit hours. Programs are encouraged to begin advising students early in their major so that they are aware of the program and, if interested, can complete their bachelor's degree requirements in a way that facilitates completion of the program. Once admitted as an undergraduate, Program Directors should ensure that students are enrolled using the plan code associated with the Accelerated Bachelor's/Master's program. Using the plan code associated with the Accelerated Bachelor's/Master's program will ensure that students may be easily

identified as they move through the program. Students will not officially matriculate into the master's degree program and be labeled as a graduate student by the university, with accompanying changes to tuition and Financial Aid (see below), until the undergraduate degree has been awarded. Once admitted to the graduate program, students must meet the academic standing requirements of their graduate program as they complete the program curriculum.

- ¹ Programs that have specialized accreditation will adhere to the admissions criteria provided by, or approved by, their specialized accreditors.
- ² The program will identify appropriate indicators of student readiness for graduate coursework (e.g., high-level performance in 300 level courses). Recognizing differences between how majors are designed, we do not specify a blanket requirement.
- ³ If students choose not to enroll in the Accelerated Bachelor's/Master's program, they still must complete all of the standard requirements associated with the undergraduate degree (e.g., a capstone).

Curriculum

Level and progression of courses. The Accelerated Bachelor's/Master's programs are designed to be competitive and attractive to our most capable students. Students admitted to Accelerated Bachelor's/Master's programs should be capable of meeting graduate level learning outcomes. Following guidance from the Higher Learning Commission, only courses taken at the 400 level or higher (including 300/400 level courses taken at the 400 level) will count toward the graduate program.^{1,2} Up to 50% of the total graduate level credit hours, required in the graduate program, may come from 300/400 level courses where the student is enrolled in the 400 level of the course. Further, at least 50% of the credit hours for the graduate program must come from courses that are designed for and restricted to graduate students who have been admitted to a graduate program at Loyola (e.g., enrolled in plan code that indicates the Accelerated Bachelor's/Master's program, typically ending with the letter "D").³

In general, graduate level coursework should not be taken prior to admission into the Accelerated Bachelor's/Master's program. Exceptions may be granted for professional programs where curriculum for the Accelerated Bachelor's/Master's program is designed to begin earlier. On the recommendation of the program's Graduate Director, students may take one of their graduate level courses before they are admitted to the Accelerated Bachelors/Master's program if they have advanced abilities in their discipline and course offerings warrant such an exception.⁴ Undergraduate degree requirements outside of the major are in no way impacted by admission to an Accelerated Bachelor's/Master's program.⁵

Shared credits. Undergraduate courses (i.e., courses offered at the 300 level or below) cannot be counted as shared credits nor count towards the master's degree. Up to 50% of the total graduate level credit hours, required in the graduate program, may be counted in meeting both the undergraduate and graduate degree requirements. Of those shared credits, students in an Accelerated Bachelor's/Master's program should begin their graduate program with the standard introductory course(s) for the program whenever possible. So that students may progress through the Accelerated Bachelor's/Master's program in a timely manner, undergraduate programs are encouraged to design their curriculum such that a student can complete some required graduate credit hours while completing the undergraduate degree. For instance, some of the graduate curriculum should also satisfy electives for the undergraduate major.

The program's Graduate Director will designate credit hours to be shared through the advising form and master's degree conferral review process. Shared credit hours will not be marked on the undergraduate record as having a special status in the undergraduate program. They will be included in the student's undergraduate earned hours and GPA. Graduate credit hours taken during the undergraduate program will not be included in the graduate GPA calculation.

- ¹ If students wish to transfer credits from another university to Loyola University Chicago, the program's Graduate director will review the relevant syllabus(es) to determine whether it meets the criteria for a 400 level course or higher.
- ² Programs with specialized accreditation requirements that allow programs to offer graduate curriculum to undergraduate students will conform to those specialized accreditation requirements.
- ³ In rare cases, the Graduate Director may authorize enrollment in a 400-level course for a highly qualified and highly motivated undergraduate, ensuring that the undergraduate's exceptional participation in the graduate class will not diminish in any way the experience of the graduate students regularly enrolled.
- ⁴ For example, if a particular course is only offered once every 2-3 years, and a student has demonstrated the necessary ability to be successful, the Graduate Director may allow a student to take a graduate level course to be shared prior to the student being formally admitted to the graduate program. See, also, footnote 4.
- ⁵ Students should not, for example, attempt to negotiate themselves out of a writing intensive requirement on the basis of admission to a graduate program.

Graduation

Degrees are awarded sequentially. All details of undergraduate commencement are handled in the ordinary way as for all students in the School/College/Institute. Once in the graduate program, students abide by the graduation deadlines set forth by the graduate program. Students in these programs must be continuously enrolled from undergraduate to graduate degree program unless given explicit permission by their program for a gap year or approved leave of absence.

LEARNING OUTCOMES

Graduates of the MS in Mathematics Program will:

1. be able to construct mathematical proofs of basic theorems, and to write these proofs clearly using correct grammatical constructs and appropriate mathematical notation;
2. have seen applications of mathematics to areas across mathematical disciplines and outside of mathematical disciplines;
3. receive the training sufficient for acceptance into PhD programs or professional schools, or for hire in mathematics related industries;
4. receive training on how to act responsibly and ethically within the discipline.

Full details on student learning outcomes available at www.luc.edu/math/msmath/curriculum/index.shtml#faq-501434Collapse (<http://www.luc.edu/math/msmath/curriculum/index.shtml/#faq-501434Collapse>)