DATA SCIENCE/MATHEMATICS (BS/MS)

The Accelerated Bachelor's Master's program allows undergraduate students to receive their Master's Degree in a total of five years. Students apply in their junior year and must complete all requirements for the undergraduate and graduate programs. They are able to finish the program in only one additional year by double counting up to 9 credits in their senior year towards both their Undergraduate Degree and their Master's Degree.

Related Programs

Major

- Mathematics (BS) (https://catalog.luc.edu/undergraduate/arts-sciences/mathematics-statistics/mathematics-bs/)

Combined

- Data Science (BS/MS) (https://catalog.luc.edu/undergraduate/accelerated-bachelors-masters-program/data-science-bsms/)
- Data Science/Applied Statistics (BS/MS) (https://catalog.luc.edu/undergraduate/accelerated-bachelors-masters-program/data-science-applied-statistics-bs-ms/)

Curriculum

Code	Title	Hours
BS Requirements		
Math Requirements		
MATH 161	Calculus I	4
MATH 162	Calculus II	4
MATH 212	Linear Algebra	3
STATS Requirements		
STAT 203	Introduction to Probability & Statistics	3
STAT 308	Applied Regression Analysis	3
STAT 310	Categorical Data Analysis	3
Select six credits of STAT 300-level electives [1,4]		6
Computer Science Requirements		
COMP 141	Introduction to Computing Tools and Techniques	3
COMP 215 / MATH 215	Object Oriented Programming with Mathematics	3
COMP 231	Data Structures & Algorithms for Informatics	3
COMP 353	Database Programming	3
Select six credits of COMP 300-level electives		6
Data Science Core		
DSCI 101	Fundamentals of Modern Data Science with R	3
STAT 338	Predictive Analytics	3
or COMP 379	Machine Learning	
COMP 317	Social, Legal, and Ethical Issues in Computing	3
COMP 358	Big Data Analytics (capstone)	3
STAT 370	Data Science Consulting (capstone)	3
MS Requirements		
Foundational Course Requirements		
MATH 416	Survey of Algebra	3
MATH 454	Survey of Analysis	3
MATH 404 / STAT 404	Probability & Statistics I [2]	3
or STAT 408	Applied Regression Analysis	
Depth Requirement Courses		
Select one of the following:		3
MATH 414	Algebra II	
MATH 415	Topics in Linear Algebra	
MATH 452	Analysis II	
MATH 453	Complex Analysis	
Select one of the following: [2]		3
MATH 405 / STAT 405	Probability & Statistics II	
STAT 410	Categorical Data Analysis	
COMP 429	Natural Language Processing	
COMP 487	Deep Learning	
DSCI 401	Introduction to Data Science	
Or Another Course with Graduate Program Director Approval		
Additional Requirements		
MATH 401	Introduction to Graduate Study in Mathematics	1
MATH 495	Graduate Practicum in Mathematics	2
Four (4) Approved 400-Level Electives in Mathematics or Statistics [3]		12
Total Hours		**83**

1. Excluding STAT 335 Introduction to Biostatistics and STAT 337 Quantitative Methods in Bioinformatics
2. Students who select MATH 404/STAT 404 in Foundational Courses may opt to take STAT 408 as a Depth Course, and vice versa.
3. Approved elective courses should be selected with advice of Graduate Program Director to complement student's previous learning and support future plans.
4. These courses may be taken as MATH/STAT 400-level courses that meet requirements for both degrees.

Suggested Sequence of Courses

The below sequence of courses is meant to be used as a suggested path for completing coursework. An individual student's completion of requirements depends on course offerings in a given term as well as the start term for a major or graduate study. Students should consult their advisor for assistance with course selection.

Course	Title	Hours
Year 1		
Fall		
DSCI 101	Fundamentals of Modern Data Science with R	3
MATH 161	Calculus I	4
	Hours	**7**
Spring		
COMP 141	Introduction to Computing Tools and Techniques	3
MATH 162	Calculus II	4
	Hours	**7**
Year 2		
Fall		
MATH 212	Linear Algebra	3

COMP 215 / MATH 215	Object Oriented Programming with Mathematics	3
	Hours	**6**
Spring		
COMP 231	Data Structures & Algorithms for Informatics	3
STAT 203	Introduction to Probability & Statistics	3
	Hours	**6**
Year 3		
Fall		
STAT 308	Applied Regression Analysis	3
COMP 353	Database Programming	3
	Hours	**6**
Spring		
COMP 300-level Course		3
COMP 300-level Course		3
COMP 317	Social, Legal, and Ethical Issues in Computing	3
	Hours	**9**
Year 4		
Fall		
STAT 388 or COMP 379	Topics or Machine Learning	3
STAT 370	Data Science Consulting	3
MATH/STAT 400-level Course		3
	Hours	**9**
Spring		
COMP 358	Big Data Analytics	3
STAT 310	Categorical Data Analysis	3
MATH/STAT 400-level Course		3
	Hours	**9**
Year 5		
Students take remainder of MS courses in consultation with Graduate Program Director.		24
	Hours	**24**
	Total Hours	**83**

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).

For more information on Admissions requirements, visit here (https://gpem.luc.edu/portal/admission/?tab=home).

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 3.
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. In offering the option of an Accelerated Bachelor's/Master's program, the university is making possible the acceleration of a student's graduate degree completion. It should be understood that students may not request deferral of their matriculation into the Master's degree program. If students would like to delay their graduate studies after earning the undergraduate degree, they may apply for admission to the traditional master's degree program. Any application of graduate credit earned while in the undergraduate program is subject to the policies of the graduate degree granting school.

Learning Outcomes

- The ability to manage large data sets in preparation for data science analysis [Data Science]
- A working knowledge of traditional statistical techniques and the ability to apply these methods to a wide array of real-world problems [Data Science]
- The ability to perform a data science analysis from beginning to end while adhering to the principles of reproducible research [Data Science]
- The ability to program in both the R and Python programming languages [Data Science]
- The ability to construct mathematical proofs of basic theorems, and to write these proofs clearly using correct grammatical constructs and appropriate mathematical notation [Mathematics]
- A working knowledge of applications of mathematics to areas across mathematical disciplines and outside of mathematical disciplines [Mathematics]
- Training sufficient for acceptance into PhD programs or professional schools, or for hire in mathematics related industries [Mathematics]
- Training on how to act responsibly and ethically within the discipline [Mathematics]