MATHEMATICS, MS

The Master of Science in mathematics is designed to achieve two objectives:

- Provide a strong program of course work in mathematics beyond the undergraduate level and
- Be flexible enough to accommodate a wide variety of student interests and backgrounds. There are no required courses in the program, but students are strongly encouraged to develop an emphasis in the courses which make up their individual plan of study; such an emphasis provides both focus and depth in the graduate experience.

Whatever their objectives in their graduate programs, students should form a close working relationship with a faculty member having similar mathematical interests as soon as possible. This will ensure good advice in planning a coherent plan of study. In addition, an advisor may be able to suggest special topics courses, independent study, or the thesis option which could all be used to pursue one's interests in greater depth. Finally, students who plan to pursue a doctoral degree in mathematics should include a sequence in analysis and a sequence in algebra in their plans of study.

Program Related Information

Program Contact

Dora Velcsov, PhD, Graduate Program Chair (GPC)
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Program Website (http://www.unomaha.edu/math/)

Fast Track Program

The Department of Mathematics and Statistical Sciences has developed a Fast Track program for highly qualified and motivated students providing the opportunity to complete a bachelor's degree and a master's degree in an accelerated time frame. With Fast Track, students may count up to nine (9) graduate hours toward the completion of their undergraduate program as well as the graduate degree program.

Program Specifics:

- This program is available for undergraduate students pursuing a BA/BS in mathematics or pursuing a double-major with BA/BS in mathematics as the primary or secondary major desiring to pursue a MA/MS/MAT in mathematics.
- Students must have completed no less than 60 undergraduate hours
- Students must have a minimum undergraduate GPA of 3.0.
- Students must complete the Fast Track Approval form and obtain all signatures and submit to the Office of Graduate Studies prior to first enrollment in a graduate course.
- Students will work with their undergraduate advisor to register for the graduate courses.
- A minimum cumulative GPA of 3.0 is required for graduate coursework to remain in good academic standing.
- Students remain undergraduates until they meet all the requirements for the undergraduate degree and are eligible for all rights and privileges granted undergraduate status including financial aid.
- Near the end of the undergraduate program, formal application to the graduate program is required. The application fee will be waived, the applicant will need to contact the Office of Graduate Studies for a fee waiver code.
  - Admission to Fast Track does NOT guarantee admission to the graduate program.

- The admit term must be after the completion term of the undergraduate degree.

Graduate Assistantships

The Department of Mathematics and Statistical Sciences annually awards graduate assistantships for work within the department. These positions come with a salary, tuition waiver, and subsidized health insurance. For the details of the nature of the work, please visit the assistantships page of the Department of Mathematics and Statistical Sciences website.

Admissions

General Application Requirements and Admission Criteria (http://catalog.unomaha.edu/graduate/admission/)

Application Deadlines

- Spring 2026: November 30
- Summer 2026: April 15
- Fall 2026: July 31

Other Requirements

For unconditional admission, an applicant should:

- Have completed a bachelor's degree with a grade point average of at least 3.0 in mathematics courses taken.
- Have completed 15 credit hours of mathematics courses beyond calculus, including MATH 3230/MATH 8235 or equivalent.
- Applicants lacking the 15 credit hours beyond calculus may be eligible for admission in a provisional or unclassified status with a deficiency to be made up in addition to the degree requirements listed.
- Applicants who satisfy the admission requirements above except for the GPA requirement may be granted provisional admission to the graduate program. They will be granted unconditional admission upon completion of 12 graduate hours with a grade of "B" or better in each course.
- **English Language Proficiency:** Applicants are required to have a command of oral and written English. Those who do not hold a baccalaureate or other advanced degree from the United States, **OR** a baccalaureate or other advanced degree from a predetermined country on the waiver list, must meet the minimum language proficiency score requirement in order to be considered for admission.

  - Internet-based TOEFL: 80, IELTS: 6.5, PTE: 53, Duolingo: 110

Degree Requirements

Required Courses

There are no required courses. Choose mathematics courses with a MATH or STAT prefix numbered 8000 or above. At least 18 of these hours must be courses with a number ending in a zero digit (8xx0). These 18 hours may include three hours of independent study, MATH 8970. Up to six hours of courses ending in a five digit may count toward the degree (8xx5). The following courses do not count for this degree; MATH 8235, STAT 8005, STAT 8805, STAT 8950, and any courses with the MTCH prefix.

If the project option is chosen, the six required hours of MATH 8960 or STAT 8960 will count towards the overall credit hour total, and the required 18 hours of courses ending in a zero digit.

If a student chooses to add a concentration to their degree program (see below) then there will be specific courses that will be needed to be completed to fulfill the concentration requirements.

Electives

Since there are no required courses, all courses are electives which must satisfy the requirements given above for the 36 credit hours. Up to 12 hours

of graduate work electives may be taken in areas related to mathematics, physics, computer science, and economics, if permission is obtained from the Graduate Program Committee.

Exit Requirements

Select One:

- ### Comprehensive Examination
  - The comprehensive examination is based on three related courses (one of which must have a number ending in a zero digit) consisting of two parts. The first part is a one-week take-home examination. The second part is a three hour examination which may be open book, at the discretion of the instructor(s). The examination is normally taken in the student's final semester and should be scheduled well in advance of the graduate college deadlines.
- ### Project
  - A mathematical or statistical project undertaken under the supervision of both a faculty advisor and an external (industry) advisory. The purpose of the project is for the student to work on a 'real-world' problem. The student will produce a written report and give an oral presentation of their work. Students are required to register for six hours of MATH 8960 or STAT 8960.

Concentrations

Students may choose (although there is no requirement to do so) to add a concentration to their mathematics MS degree. There are currently four available concentrations:

Mathematics, MS with Computational Mathematics concentration
Mathematics, MS with Data Science concentration
Mathematics, MS with Operations Research concentration
Mathematics, MS with Statistics concentration

Total Credit Hours: 36

Concentrations

Courses numbered 8–5 will not count towards the MS degree in Mathematics.

Computational Mathematics Concentration

Code	Title	Credits
Core Courses		
Select at least 15 credits from the following:		15
MATH 8250	PARTIAL DIFFERENTIAL EQUATIONS	
MATH 8336	INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS [1]	
MATH 8406	THE FINITE ELEMENT METHOD [1]	
MATH/CSCI 8500	NUMERICAL LINEAR ALGEBRA	
MATH/CSCI 8510	NUMERICAL DIFFERENTIAL EQUATIONS	
MATH 8970	INDEPENDENT GRADUATE STUDIES	
Electives		
Select at least 21 credit hours of courses related to computational mathematics (see below).		21
Total Credits		**36**

[1] Students who were undergraduates at UNO and took MATH 4330 or MATH 4400 may not take MATH 8336 or MATH 8406 at the graduate level. Students can replace these requirements with additional elective courses.

Electives

At least 21 credit hours of courses related to computational mathematics. Students must have at least 18 hours of courses ending on 0, including the core courses.

Some suggested courses are provided below. Other elective courses may be possible with the prior permission of the graduate program chair.

If any of the core course requirements were waived, then additional electives should be taken in their place.

Code	Title	Credits
MATH 8056	LINEAR ALGEBRA [1]	3
MATH 8236	MATHEMATICAL ANALYSIS I [1]	3
MATH 8246	MATHEMATICAL ANALYSIS II [1]	3
MATH 8276	COMPLEX ANALYSIS [1]	3
MATH 8356	ORDINARY DIFFERENTIAL EQUATIONS [1]	3
MATH 8400	DYNAMICAL SYSTEMS AND CHAOS	3
MATH 8766	TOPICS IN APPLIED MATHEMATICS	3
MATH 8970	INDEPENDENT GRADUATE STUDIES	1-3

[1] Students who were undergraduates at UNO and took MATH 4350, MATH 4050, MATH 4230, MATH 4240, or MATH 4270 may not take MATH 8356, MATH 8056, MATH 8236, MATH 8246, or MATH 8276 at the graduate level.

Exit Requirements

Comprehensive Examination

The comprehensive examination is based on three related courses (one of which must have a number ending in a zero digit) consisting of two parts. The first part is a one-week take-home examination. The second part is a 3-hour examination which may be open book, at the discretion of the instructor(s). The examination is normally taken in the student's final semester and should be scheduled well in advance of the graduate college deadlines.

(Note: The project exit requirement is not available for those students wishing to complete the computational mathematics concentration, only the comprehensive exam exit requirement is allowed).

Data Science Concentration

Prerequisites

Some statistics and computer programming are highly recommended.

Required Courses

Code	Title	Credits
Introductory Courses		
MATH 8746	INTRODUCTION TO PROBABILITY AND STATISTICS I [1]	3
MATH 8756	INTRODUCTION TO PROBABILITY AND STATISTICS II [1]	3
Core Courses		
STAT 8416	INTRODUCTION TO DATA SCIENCE [2]	3
STAT 8426	EXPLORATORY DATA VISUALIZATION AND QUANTIFICATION [2]	3
MATH/CSCI 8306	DETERMINISTIC OPERATIONS RESEARCH MODELS [2]	3
Approved Electives		
Select at least 15 credit hours from the following: [3]		15
MATH/CSCI 8316	PROBABILISTIC OPERATIONS RESEARCH MODELS [4]	
MATH 8430	LINEAR PROGRAMMING	

MATH 8440	NETWORK PROGRAMMING	
MATH 8460	INTEGER PROGRAMMING	
MATH 8650	INTRODUCTION TO PROBABILITY MODELS	
MATH 8670	TOPICS IN PROBABILITY AND STATISTICS	
MATH 8970	INDEPENDENT GRADUATE STUDIES	
STAT 8436	LINEAR MODELS [4]	
STAT 8446	TIME SERIES ANALYSIS [4]	
STAT 8456	INTRODUCTION TO MACHINE LEARNING AND DATA MINING [4]	
STAT 8700	BAYESIAN STATISTICS	
STAT 8710	DESIGN AND ANALYSIS OF EXPERIMENTS	
STAT 8720	RELIABILITY THEORY	
STAT 8730	ADVANCED STATISTICAL MACHINE LEARNING	
STAT/MATH 8960	MASTER'S PROJECT	6
Total Credits		**36**

[1] Students who were undergraduates at UNO and took MATH 4740 or MATH 4750 may not take MATH 8746 or MATH 8756. For those students who can demonstrate previous statistical exposure can appeal to the graduate program chair to waive the MATH 8746/MATH 8756 requirements. Students can replace these requirements with additional elective courses.

[2] Students who were undergraduates at UNO and took STAT 4410, STAT 4420, or MATH 4300 may not take STAT 8416, STAT 8426, or MATH 8306 at the graduate level. Students can replace these requirements with additional elective courses.

[3] If any of the introductory or core course requirements were waived, then additional electives should be taken in their place. Other elective courses may be possible with the prior permission of the graduate program chair.

[4] Students who were undergraduates at UNO and took MATH 4310, STAT 4430, or STAT 4440 may not take MATH 8316, STAT 8436, or STAT 8446 at the graduate level.

Exit Requirement

Each student is required to complete a project involving working with real-world data. The student will be advised by both a faculty and external advisor, and a completed written and oral report is required.

Students are required to sign up for 6 hours of MATH 8960 or STAT 8960.

(Note: The comprehensive exam exit requirement is not available for those students wishing to complete the data science concentration, only the project exit requirement is allowed).

Operations Research Concentration

Code	Title	Credits
Core Courses		
Select at least 5 of the following:		15
MATH/CSCI 8306	DETERMINISTIC OPERATIONS RESEARCH MODELS [1]	
MATH/CSCI 8316	PROBABILISTIC OPERATIONS RESEARCH MODELS [1]	
MATH 8326	COMPUTATIONAL OPERATIONS RESEARCH [1]	
MATH 8430	LINEAR PROGRAMMING	
MATH 8440	NETWORK PROGRAMMING	
MATH 8460	INTEGER PROGRAMMING	
Electives		
Select one of the following (see below):		21

For students choosing the comprehensive exam option, at least 21 credit hours of courses related to operations research

For students choosing the project option, at least 15 credit hours of courses related to operations research and 6 credit hours of MATH 8960

Total Credits		**36**

[1] Students who were undergraduates at UNO and took MATH 4300, MATH 4310, or MATH 4320 may not take MATH 8306, MATH 8316, or MATH 8326 at the graduate level. Students can replace these requirements with additional elective courses.

Electives

For students choosing the comprehensive exam option, at least 21 credit hours of courses related to operations research.

For students choosing the project option, at least 15 credit hours of courses related to operations research.

Students must have at least 18 hours of courses ending on 0, including the core courses and, for those choosing the project option, the 6 hours of project, MATH 8960.

Some suggested courses are provided below. Other elective courses may be possible with the prior permission of the graduate program chair.

If any of the core course requirements were waived, then additional electives should be taken in their place.

Code	Title	Credits
MATH/CSCI 8156	GRAPH THEORY & APPLICATIONS [1]	3
MATH/CSCI 8520	ADVANCED TOPICS IN OPERATIONS RESEARCH	3
MATH 8650	INTRODUCTION TO PROBABILITY MODELS	3
MATH 8746	INTRODUCTION TO PROBABILITY AND STATISTICS I [1]	3
MATH 8756	INTRODUCTION TO PROBABILITY AND STATISTICS II [1]	3
MATH 8970	INDEPENDENT GRADUATE STUDIES	1-3
STAT 8416	INTRODUCTION TO DATA SCIENCE [1]	3
STAT 8426	EXPLORATORY DATA VISUALIZATION AND QUANTIFICATION [1]	3
STAT 8436	LINEAR MODELS [1]	3
STAT 8446	TIME SERIES ANALYSIS [1]	3

[1] Students who were undergraduates at UNO and took MATH 4740, MATH 4750, MATH 4150, STAT 4410, STAT 4420, STAT 4430, or STAT 4440 may not take MATH 8746, MATH 8756, MATH 8156, STAT 8416, STAT 8426, STAT 8436, or STAT 8446 at the graduate level.

Exit Requirements

Code	Title	Credits
Comprehensive Examination or		
MATH/STAT 8960	MASTER'S PROJECT	6

The comprehensive examination is based on three related courses (one of which must have a number ending in a zero digit) consisting of two parts. The first part is a one-week take-home examination. The second part is a 3-hour examination which may be open book, at the discretion of the instructor(s). The examination is normally taken in the student's final

semester and should be scheduled well in advance of the graduate college deadlines.

A project undertaken under the supervision of both a faculty advisor and an external (industry) advisory. The purpose of the project is for the student to work on a 'real-world' problem using the skills learned during their coursework. The student will produce a written report and give an oral presentation of their work. Students are required to register for 6 hours of MATH 8960.

Statistics Concentration

Code	Title	Credits
Core Courses		
MATH 8746	INTRODUCTION TO PROBABILITY AND STATISTICS I [1]	3
MATH 8756	INTRODUCTION TO PROBABILITY AND STATISTICS II [1]	3
STAT 8436	LINEAR MODELS [1]	3
STAT 8710	DESIGN AND ANALYSIS OF EXPERIMENTS	3
Electives		
Select one of the following (see below):		24
	For students choosing the comprehensive exam option, at least 24 credit hours of courses with a statistical nature, with at least 15 hours of courses ending in 0.	
	For students choosing the project option, at least 18 credit hours of courses with a statistical nature, with at least 9 hours of courses ending in 0. Six hours of MATH 8960 are required.	
Total Credits		**36**

[1] Students who were undergraduates at UNO and took MATH 4740, MATH 4750, or STAT 4430 may not take MATH 8746, MATH 8756, or STAT 8436 at the graduate level. Students can replace these requirements with additional elective courses.

Electives

For students choosing the comprehensive exam option, at least 24 credit hours of courses with a statistical nature, with at least 15 hours of courses ending in 0.

For students choosing the project option, at least 18 credit hours of courses with a statistical nature, with at least 9 hours of courses ending in 0.

Some suggested courses are provided below. Other elective courses may be possible with the prior permission of the graduate program chair.

If any of the core course requirements were waived, then additional electives should be taken in their place.

Code	Title	Credits
MATH/CSCI 8316	PROBABILISTIC OPERATIONS RESEARCH MODELS [1]	3
MATH 8650	INTRODUCTION TO PROBABILITY MODELS	3
MATH 8670	TOPICS IN PROBABILITY AND STATISTICS	3
MATH 8970	INDEPENDENT GRADUATE STUDIES	1-3
STAT 8416	INTRODUCTION TO DATA SCIENCE [1]	3
STAT 8426	EXPLORATORY DATA VISUALIZATION AND QUANTIFICATION [1]	3
STAT 8446	TIME SERIES ANALYSIS [1]	3
STAT 8700	BAYESIAN STATISTICS	3
STAT 8720	RELIABILITY THEORY	3
STAT 8730	ADVANCED STATISTICAL MACHINE LEARNING	3

[1] Students who were undergraduates at UNO and took MATH 4310, STAT 4410, STAT 4420, or STAT 4440 may not take MATH 8316, STAT 8416, STAT 8426, or STAT 8446 at the graduate level.

Exit Requirements

Code	Title	Credits
Comprehensive Examination or		
STAT/MATH 8960	MASTER'S PROJECT	6

The comprehensive examination is based on three related courses (one of which must have a number ending in a zero digit) consisting of two parts. The first part is a one-week take-home examination. The second part is a 3-hour examination which may be open book, at the discretion of the instructor(s). The examination is normally taken in the student's final semester and should be scheduled well in advance of the graduate college deadlines.

A statistical project undertaken under the supervision of both a faculty advisor and an external (industry) advisory. The purpose of the project is for the student to work on a 'real-world' problem. The student will produce a written report and give an oral presentation of their work.

Students are required to register for 6 hours of STAT 8960.