

MATHEMATICS, MS: ACTUARIAL SCIENCE

Objective of Mathematics MS: Actuarial Science (Option C)

The program provides a mathematically rigorous education in actuarial science, prepares students for actuarial professional exams, and develops their economics and business reasoning skills. Students obtain thorough knowledge in the fundamentals of actuarial science such as applied probability models, applied statistics, credibility, financial economics, life contingencies, loss models, and risk theory. Emphasis is placed on developing skills that are highly valued by employers and thus are essential for a successful career as actuary. This program is intended for students who will seek employment as an actuary upon completion of the degree. Those interested in entering the department's Ph.D. program should consider a different Master's option.

Overview of Mathematical Sciences Department MS programs

The Department of Mathematical Sciences offers graduate programs of study in mathematics with specializations in the fields of algebra, analysis, topology, applied mathematics, probability and statistics, and actuarial science.

The programs of study at the master's level are designed to suit both the student intending to continue toward a PhD as well as the student who wishes to begin a professional career upon completion of the master's program.

The student may prepare for a career in teaching at the secondary or college level and for a career in research in the academic, industrial, government, or business communities.

Three options for the master's degree are offered: the standard mathematics option (A), the statistics option (B), and the actuarial science option (C). Students who plan to continue for a PhD degree with a focus on mathematics/statistics should elect an option from options A, B, C, or the dual master's degree option.

Dual Master's Degree Option

In addition to multiple options available for MS in mathematics, the Department of Mathematical Sciences at UWM and the Department of Technomathematics of Fachhochschule Aachen (FHA), Germany have recently created a Dual Master's Degree Program in Mathematics. The students enrolled in this program will be able to earn Master's degrees from both institutions upon completion of the common course requirements.

The program is designed in such a way that students typically will be able to complete all the course requirements within a two-year time period (one year at each institution). Within this program students can choose courses that will allow them to concentrate in the areas of Statistics, Numerical Analysis or General Mathematics. Complete information on the admission policy and graduation requirements, including sample schedules, is available at the Department of Mathematical Sciences web page <http://uwm.edu/math/graduate/>.

Admission Requirements

Application Deadlines

Application deadlines vary by program, please review the application deadline chart (<http://uwm.edu/graduateschool/program-deadlines/>) for specific programs. Other important dates and deadlines can be found by using the One Stop calendars (<https://uwm.edu/onestop/dates-and-deadlines/>).

Admission

Students with undergraduate degrees in mathematics, statistics, actuarial science, economics or a related area are eligible for admission. Applicants should have a strong mathematical background that includes three semesters of calculus, linear algebra, probability, and mathematical statistics. Students lacking this background may be admitted provided that the deficiencies amount to no more than two courses. Although not required, having one actuarial professional exam passed would be an asset.

Credits and Courses

The minimum degree requirement is 33 credits. In order to graduate, the following requirements must be completed:

Code	Title	Credits
The following 24 credits:		
ACTSCI 791	Investment Mathematics II	3
ACTSCI 793	Actuarial Models I	3
ACTSCI 794	Actuarial Models II	3
ACTSCI 796	Actuarial Statistics I	3
ACTSCI 797	Actuarial Statistics II	3
MTHSTAT 763	Regression Analysis	3
MTHSTAT 764	Time Series Analysis	3
MTHSTAT 768	Multivariate Statistical Analysis	3
One of the following two courses:		
ACTSCI 891	Actuarial Risk Theory	3
ACTSCI 895	Topics in Actuarial Science:	3
One of the following pairs:		
MTHSTAT 871 & MTHSTAT 872	Mathematical Statistics I and Mathematical Statistics II	6-8
ECON 701 & ECON 702	Economic Theory: Microeconomics and Economic Theory: Macroeconomics	6-8
BUS ADM 703 & BUSMGMT 705	Financial Accounting and Corporate Finance	6-8
COMPSCI 557G & ACTSCI 790	Introduction to Database Systems and Actuarial Internship	6-8
MATH 783 & MTHSTAT 766	Introduction to Probability Models and Computational Statistics	6-8
Total Credits		33-35

Students who have completed program courses for undergraduate credit should discuss alternative graduate-level courses to substitute for those courses in their programs of study.

Thesis

A thesis is not required for the actuarial science option. Rather, students must pass three departmental written proficiency exams, which are based on the learning objectives of the actuarial professional exams P,

FM and one of FAM, ALTAM, ASTAM. Waivers for departmental exams are granted for students who have passed the corresponding professional exams.

Professional Development

For future advancement in the field of actuarial science, "Validation by Educational Experience" (VEE) credits are required. VEE credits may be earned from the Society of Actuaries (SOA) and Casualty Actuarial Society (CAS) with a grade of B- or better in the following courses:

Code	Title	Credits
MTHSTAT 871	Mathematical Statistics I	3
MTHSTAT 872	Mathematical Statistics II (VEE-Mathematical Statistics)	3
ECON 701	Economic Theory: Microeconomics (VEE-Economics)	4
ECON 702	Economic Theory: Macroeconomics (VEE-Economics)	4
BUS ADM 703	Financial Accounting (VEE-Accounting and Finance)	3
BUSMGMT 705	Corporate Finance (VEE-Accounting and Finance)	3

Courses taken at other universities may be used to meet the VEE requirement of the SOA/CAS.

Additional Requirements

Major Professor as Advisor

The student must have a major professor, selected from the members of the Actuarial Science Committee, to advise and supervise the student's studies. The entering student is assigned an advisor by the chair of the committee. Before the start of studies, each student in the program must develop a plan of study in consultation with the Committee.

Time Limit

Full-time students are expected to complete the program in two years. Students must complete all degree requirements within five years of initial enrollment.

Mathematics MS Learning Outcomes

Students graduating from the program will be able to:

1. **apply** advanced knowledge of a range of topics in Mathematics or related fields, in the context of the chosen MS option.
2. **apply** analytical and critical thinking skills required for the efficient use and understanding of the mathematical sciences.