# Mathematics MA, Data Science Emphasis

## Admission Requirements

Applicants must have at least a bachelor's degree in mathematics or in a field with significant mathematical content. Examples of such fields include computer science, data science, economics, engineering and physics. An applicant's record should demonstrate superior achievement in undergraduate mathematics.

Individuals may apply for direct admission to either the M.A. or Ph.D. program. Candidates for the M.A. degree may choose an emphasis in mathematics or data science. Students in the M.A. program who want to transfer to the Ph.D. program upon successful completion of 15 credit hours must fill out a new application through Graduate Admissions.

Students intending to enter the Ph.D. program must have a working ability in modern programming technologies. A student with a deficiency in this area may be required to take courses at the undergraduate level in computer science.

Applicants for the Ph.D. program must, in addition, submit three letters of recommendation and scores from the Graduate Record Examination (GRE) general aptitude test.

## Preliminary Advisement

Incoming students are assigned advisers with whom they should consult before each registration period to determine an appropriate course of study. If necessary, students may be required to complete undergraduate course work without receiving graduate credit.

Students interested in the Ph.D. program in mathematical and computational sciences with the computer science option must follow the requirements for that program and that option.

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## Degree Requirements

Candidates for the M.A. degree must complete 30 hours of course work with at least 15 hours of courses numbered 5000 or above. Up to 6 credit hours can be completed outside the Department of Mathematics and Statistics in a related field, with graduate program director's prior approval. Up to 9 graduate credit hours could be transferred into the the program, pending the approval of the Graduate School. All courses numbered below 5000 must be completed with grades of at least B. The selections of the courses numbered 5000 or above need the prior approval of the graduate advisor.

For the M.A. degree with data science emphasis, the courses taken must include the data-science core courses and five elective courses chosen from the data-science electives listed below. Up to 2 courses in the data-science electives can be substituted with other courses upon student's request and graduate program director's approval.

Students who have already completed courses equivalent to those in the core may substitute other courses numbered above 4000. All substitutions of courses for those listed in the core require the prior approval of the graduate director.

## Thesis Option

The non-core course work may consist of an M.A. thesis written under the direction of a faculty member in the Department of Mathematics and Statistics. A thesis is not, however, required for this degree. A student who wishes to write a thesis should enroll in 6 hours of MATH 6900, M.A. Thesis. Students writing an M.A. thesis must defend their thesis in an oral exam administered by a committee of three department members which includes the thesis director.

| Core Courses | | |
|---|---|---|
| MATH 4005 | Exploratory Data Analysis with R | 3 |
| MATH 4200 | Mathematical Statistics I | 3 |
| MATH 4210 | Mathematical Statistics II | 3 |
| MATH 5070 | Nonlinear Optimization | 3 |
| MATH 5250 | Statistical Methods in Learning and Modeling | 3 |
| **Elective Courses** | | **15** |
| Choose five of the following courses: | | |
| MATH 4220 | Bayesian Statistical Methods | |
| MATH 4260 | Introduction to Stochastic Processes | |
| MATH 5080 | Scientific Computation | |
| MATH 5090 | High-dimensional Data Analysis | |
| MATH 5225 | Statistical Computing | |
| MATH 5320 | Topics in Statistics and its Applications | |
| MATH 5600 | Topics in Computation | |
| MATH 5770 | Advanced Topics in Nonlinear Optimization | |
| CMP SCI 5340 | Machine Learning | |
| CMP SCI 5342 | Data Mining | |
| **Total Hours** | | **30** |

## Financial Assistance

Any student who intends to apply for financial assistance, in the form of a teaching assistantship or a research assistantship, is required to have three letters of recommendation submitted with the application to the graduate program in Mathematics or Computer Science. The application must include scores on the GRE general aptitude test. Applicants are also encouraged to submit scores in the GRE subject area test in Mathematics or Computer Science. Applications for financial assistance should be submitted before February 15 prior to the academic year in which the student expects to begin graduate study. Notifications of awards are generally made March 15, and students awarded financial assistance are expected to return letters of acceptance by April 15.