Mathematical and Computational Science PhD, Statistics Emphasis

Effective Fall 2021, the Mathematics and Computational Sciences with an emphasis in Statistics program will no longer be accepting applications.

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.

Doctor of Philosophy in Mathematical and Computational Sciences

The program has three options:

1. Mathematics Option
2. Computer Science Option
3. Statistics Option

The requirements for the Ph.D. degree include the following:

1. Course work
2. Ph.D. candidacy
3. Doctoral dissertation

The requirements are described in detail below.

1. Course Work
   A minimum of 60 hours of courses numbered 4000 or above.

   In the Mathematics Option, at least 33 hours must be in courses numbered 5000 or above.

   In the Computer Science Option, at least 45 hours must be in courses numbered 5000 or above.

   In the Statistics Option, at least 33 hours must be in courses numbered 5000 or above.

At most 9 hours of a student's enrollment in Dissertation Research may be counted. Students are expected to maintain a 3.0 average on a 4.0 scale. All courses numbered below 5000 must be completed with a grade of at least B. Courses outside the Department of Mathematics and Computer Science will require approval of the graduate director.

When students who have earned a Master's degree are admitted to the doctoral program, appropriate credits of course work may be applied toward meeting the requirements for the doctoral degree, subject to Graduate School regulations and the approval of the graduate director. The same applied to those with some appropriate graduate credits but without a completed Master's degree.

2. Ph.D. Candidacy
   Advancement to Ph.D. candidacy is a three-step process consisting of:
   a. Completing 18 hours of 5000 level courses other than Ph.D. Dissertation Research as appropriate for the selected option.
   b. Passing the comprehensive examination.
   c. Selecting a Ph.D. committee and preparing a dissertation proposal and defense of the proposal.

Qualifying Examination

A student must fulfill the following requirements.

Basic Requirement

Pass one written examination covering fundamental topics. This examination would normally take place within the first 12 credit hours of study after admission to the Ph.D. program.

Mathematics Option

Topics from real analysis, complex analysis, and linear algebra:

MATH 4100	Real Analysis I	3
MATH 4160	Complex Analysis I	3
MATH 4450	Linear Algebra	3
Total Hours		**9**

Computer Science Option

Topics from the theory of programming languages, operating systems, analysis of algorithms, and computer systems:

CMP SCI 4250	Programming Languages	3
CMP SCI 4760	Operating Systems	3
CMP SCI 5130	Advanced Data Structures and Algorithms	3
CMP SCI 5700	Computer Systems	3
Total Hours		**12**

Statistics Option

Topics from real analysis, linear algebra, and mathematical statistics:

MATH 4100	Real Analysis I	3
MATH 4450	Linear Algebra	3
MATH 4200	Mathematical Statistics I	3
MATH 4210	Mathematical Statistics II	3
Total Hours		**12**

Additional Requirement

After fulfilling the basic requirement above, the student must meet one of the following:

1. Pass a written examination in an area of the student's interests. This area will be approved by the graduate committee and will be based on a set of two or more graduate courses taken by the student. This examination would normally take place within the first 24 credit hours of study after admission to the Ph.D. program.

2. Write a survey paper in a specialized area under the direction of a member of the graduate faculty. The student should propose to take this option when he/she has already finished at least 2 graduate level courses and has the approval of the graduate committee. The paper should be submitted within four semesters, at which time an oral examination given by a committee of at least three members of the graduate faculty must be passed.

In both parts 1) and 2), the graduate committee will determine if the topics are consistent with the option that the student is pursuing.

Dissertation Committee and Dissertation Proposal

After completing the comprehensive examinations, each student chooses a dissertation advisor and prepares a Dissertation Proposal. Usually students choose an advisor from contacts made through their course work. The dissertation committee will be formed, and the student will meet with this committee for an oral defense of his/her dissertation proposal. The dissertation proposal is a substantial document describing the problem to be worked on and the methods to be used, as well as demonstrating the student's proficiency in written communication.

Doctoral Dissertation

Each Ph.D. candidate must write a dissertation that is an original contribution to the field on a topic approved by the candidate's Ph.D. Committee and the department, and which meets the standards and requirements set by the Graduate School including the public defense of the dissertation. Students working on a dissertation may enroll in Ph.D. Dissertation Research, as appropriate for the selected option. A maximum of 9 hours Dissertation Research can be used toward the required hours of work in courses numbered 5000 or above.