**MATHEMATICAL SCIENCES PH.D.**

All students must meet the Requirements for the Doctor of Philosophy Degree

**OVERVIEW**

The Department of Mathematics and Statistics offers programs towards the Doctor of Philosophy in Mathematical Sciences (the Mathematical Sciences Ph.D. degree). There are three areas of concentration: applied mathematics, core mathematics and statistics. Students concentrating in either core or applied mathematics are encouraged to take courses in both core mathematics and applied mathematics, so as to gain an appreciation of the methods of both, and the connections between theory and applications.

Opportunities for research arise from the research interests of the Department faculty, which include analysis, algebra, biomathematics, combinatorics, complex systems, computational social science, differential equations, fluid mechanics, graph theory, mathematics education, modeling, network science, and number theory. Research foci in statistics include bioinformatics, sequential analysis, three stage sampling, time series analysis, survival data analysis, discriminant analysis, bootstrap methods, categorical data analysis, measurement error models, and experimental design. Opportunities are available for biostatistical research related to problems in agriculture and the life sciences, health and medicine, and natural resources and the environment.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy**

Because of the breadth of pure and applied mathematics and statistics, it is recognized that applicants for admission will have diverse backgrounds. Admission requirements are therefore flexible. Applicants should have demonstrated strength in either core or applied mathematics, a bachelor’s degree with a major in mathematics, statistics or a closely related discipline, and satisfactory scores on the general section of the Graduate Record Examination.

**Minimum Degree Requirements for the Degree of Doctor of Philosophy**

Each student must complete the comprehensive examination and an approved plan of study including at least seventy-five credits in course work or dissertation research. The student is required to write a doctoral dissertation and pass a final oral defense of that dissertation. The department requires two semesters of college-teaching experience. Students are expected to demonstrate appropriate proficiency in the use of technology. There is no formal language requirement.

**Master’s Degree Credential:** Students who do not have a master’s in mathematical science in the track they are pursuing for the doctorate may petition their doctoral Studies Committee and the Graduate College to receive a master’s degree during the progression of their doctoral studies. Students must complete the requirements of the course-based option for the master’s in the relevant discipline (mathematics, biostatistics or statistics), including a master’s comprehensive examination that is distinct from the doctoral comprehensive examination. Students should indicate their intent to pursue the master’s prior to the second year in the doctoral program to provide appropriate advising for completion of the master’s requirements. Completion of the requirements for the master’s and the petition to the Graduate College to award the master’s must occur before completion of the final component of the doctoral comprehensive examination.

**Comprehensive Examination**

**Core and Applied Mathematics Tracks:** The Examination consists of three parts, two written and one oral. Syllabi for these exams are available from the Director of Graduate Studies in Mathematics. They are taken at distinct times and all three must be satisfactorily completed in order to advance to candidacy. For students with a concentration in Core Mathematics, one three-hour written exam is in real and complex analysis, and the other three-hour written exam is in algebra. For students with a concentration in Applied Mathematics, one three-hour written exam is in numerical analysis and the other three-hour written exam is in differential equations.

The two-hour oral examination is conducted by the studies committee on a topic chosen by the student in consultation with the committee.

One written examination must be passed by the middle of the second year in the program. All three exams must be passed by the beginning of the third year.

**Statistics Track:** The Examination consists of three parts, two written and one oral. They are taken at distinct times and all three must be satisfactorily completed in order to advance to candidacy. The first written exam is based on the courses STAT 211, STAT 221, STAT 223, STAT 231, STAT 251, and STAT 261. The first component of the comprehensive exam is typically held two weeks after the final exam period in the spring semester. The second written exam is an extensive literature review of a topical area written in the form of a review paper and must be passed by the middle of the second year in the program. The oral exam is scheduled after successful completion of both written exams and must be passed by the beginning of the third year. The oral exam is a presentation of the current state of research in a defined area and proposal for the future work to be conducted.

**All tracks:** The student can take each component of the comprehensive exam a maximum of two times. The exam components are conducted and assessed by the studies committee.

**Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy**

Successful completion of the comprehensive examination.