PHD IN MATHEMATICS

The main goal of the **Ph.D. program** is to train mathematicians and statisticians who intend to make research in these areas their life work. Since 1967 when the University of Toledo joined the Ohio university system, the Department of Mathematics and Statistics has offered a strong doctoral program and its graduates now occupy academic positions in colleges and universities around the world.

The defining stage of the Ph.D. program is the writing and defense of a dissertation, demonstrating the student's ability to independently attack and solve in an original manner a significant mathematical or statistical problem. No firm timetable can be given for completion of this stage but generally, it can be expected to take two to three years. Possible areas for thesis research in the Department include group theory, non-commutative algebra and representation theory, operator theory, harmonic analysis, several complex variables, partial differential equations, dynamical systems, differential geometry, mathematical physics, mathematical biology, geometric topology, control theory and statistics.. The number of credit hours required is a minimum of 90, 60 if entering with a master's degree in the field.

The PhD program in Mathematics concentrations include:

- Applied Mathematics
- Pure Mathematics
- Statistics

The PhD program in Mathematics concentrations include:

The broad requirements for the doctorate in **applied mathematics concentration** are as follows:

1. A student must pass a qualifying examination within two years of entering the program. Mathematics students must pass two topics chosen from algebra, topology, differential equations and real analysis. For statistics students, the two topics must be measure-theoretic probability-theory of statistics and real analysis.

2. A minimum of 90 hours of graduate credit must be completed; 60 hours if the student holds a master's degree upon entry. Colloquium (6930) and Proseminar (6940) are excluded. Pure Mathematics students must complete two semester sequences at the 6000 level in algebra, topology, real analysis (first year sequences) while Applied Mathematics students must complete two semester sequences at the 6000 level in differential equations, real analysis and one between topology and algebra (first year sequences). Statistics students must complete measure-theoretic probability, theory of statistics, and other 6000-level courses selected in consultation with the Statistics graduate advisor. No more that 36 credit hours of Dissertation (8960) shall be counted toward the total.

4. In addition to the first-year sequences, Mathematic students (Pure and Applied) must successfully complete three catalog-listed 6000/8000 year-long sequences excluding (6/8720,6/8730).

4. The student must pass an oral examination in the general area of the intended thesis research within one year of passing the qualifying examination.

5. All doctoral students are expected to spend two consecutive semesters in supervised teaching. Enrollment in the Proseminar is mandatory every semester if credit hour limitations allow it.

6. The student must write a Ph.D. doctoral dissertation under the direction of a faculty member. Before completing the dissertation, the student must report on it in an open seminar. An outside examiner must approve the completed dissertation, and the student must defend it before a faculty committee appointed for that purpose

The broad requirements for the doctorate in mathematics with a **pure mathematics concentration** are as follows:

1. A student must pass a qualifying examination within two years of entering the program. Mathematics students must pass two topics chosen from algebra, topology, differential equations and real analysis. For statistics students, the two topics must be measure-theoretic probability-theory of statistics and real analysis.

2. A minimum of 90 hours of graduate credit must be completed; 60 hours if the student holds a master's degree upon entry. Colloquium (6930) and Proseminar (6940) are excluded. Pure Mathematics students must complete two semester sequences at the 6000 level in algebra, topology, real analysis (first year sequences) while Applied Mathematics students must complete two semester sequences at the 6000 level in differential equations, real analysis and one between topology and algebra (first year sequences). Statistics students must complete measure-theoretic probability, theory of statistics, and other 6000-level courses selected in consultation with the Statistics graduate advisor. No more than 36 credit hours of Dissertation (8960) can be applied toward the total.

3. In addition to the first-year sequences, Mathematic students (Pure and Applied) must successfully complete three catalog-listed 6000/8000 year-long sequences excluding (6/8720,6/8730).

4. The student must pass an oral examination in the general area of the intended thesis research within one year of passing the qualifying examination.

5. All doctoral students are expected to spend two consecutive semesters in supervised teaching. Enrollment in the Proseminar is mandatory every semester if credit hour limitations allow it.

6. The student must write a Ph.D. doctoral dissertation under the direction of a faculty member. Before completing the dissertation, the student must report on it in an open seminar. An outside examiner must approve the completed dissertation, and the student must defend it before a faculty committee appointed for that purpose

THE UNIVERSITY OF
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1872

The broad requirements for the doctorate in mathematics with a **statistics concentrations** are as follows:

1. A student must pass a qualifying examination within two years of entering the program. Mathematics students must pass two topics chosen from algebra, topology, differential equations and real analysis. For statistics students, the two topics must be measure-theoretic probability-theory of statistics and real analysis.

2. A minimum of 90 hours of graduate credit must be completed; 60 hours if the student holds a master's degree upon entry. Colloquium (6930) and Proseminar (6940) are excluded. Pure Mathematics students must complete two semester sequences at the 6000 level in algebra, topology, real analysis (first year sequences) while Applied Mathematics students must complete two semester sequences at the 6000 level in differential equations, real analysis and one between topology and algebra (first year sequences). Statistics students must complete measure-theoretic probability, theory of statistics, and other 6000-level courses selected in consultation with the Statistics graduate advisor. No more than 36 credit hours of Dissertation (8960) can be applied toward the total.

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- PLO. 1 Students will explain research papers in mathematics.
- PLO 2. Students will formulate a research problem in mathematics.
- PLO 3. Students will create independent research in a specific mathematical area.
- PLO 4. Students will describe and illustrate, both written and orally, the results of their research.