

Ph. D. Mathematical Sciences

The Ph.D. in Mathematical Sciences at Portland State is an exciting program which differs significantly from the traditional model of Ph.D. education in Mathematical Sciences and is designed specifically to provide participants with the skills needed to thrive in the changing environment currently characterizing industry, government, and higher education.

The program aims to develop professionals who have versatility, who are conversant in other fields, and who can communicate effectively with people in other professional cultures. These qualities are essential to those seeking non-academic careers, and for students whose career goals include the professorate, the possession of these qualities is a requirement for successful participation in the academy of the 21st century. The program is flexible, learner driven, and provides participants with a structured environment, professional guidance, and advising support.

The program prepares the candidate to be well grounded in his or her field, yet conversant with several subfields by dedicating approximately 25% of the credit hour requirements to professional development, cross-disciplinary experiences, and allied area coursework. Students will directly experience these other cultures while learning effective means of collaboration and communication. The program accommodates a broad range of interdisciplinary partners. Students take a concentration of allied area courses, usually outside the department, in one (or more) of Mathematics' and Statistics' many natural partner disciplines, such as Computer Science, Engineering, Physics, Biology, Economics, Finance, Urban Studies and Planning, Medicine, or Public Health. The courses are chosen with the assistance of the allied area advisor to form a coherent area of study directly relevant to the student's goals. This experience will also be reflected in the thesis and furthered in a cross-disciplinary seminar/internship experience. This model of study will also apply to those whose career plans focus on traditional academic employment, where the allied area course work will here focus on professional development.

Please see web site for updates and links to pertinent polices: <https://www.pdx.edu/math/ph-d-mathematical-sciences>

Admission:

Program Prerequisites: Applicants for admission to the Mathematical Sciences Ph.D. program will be expected to have completed an undergraduate degree with the equivalent of a bachelor's degree in Mathematics or Statistics containing an adequate background in Computer Science. Applicants with degrees in related disciplines will be considered provided the applicant demonstrates a strong mathematical proficiency. Applicants are encouraged to submit a description of topics covered and textbooks used in any relevant non-standard courses. Admission to the program requires that the department find the applicant prepared to undertake study leading to the doctoral degree in mathematics.

In addition to program prerequisites, applicants must meet the university's minimum admission requirements including English language proficiency: [pdx.edu/graduate-admissions](https://www.pdx.edu/graduate-admissions)

Instructions on how to apply: [pdx.edu/math/how-to-apply](https://www.pdx.edu/math/how-to-apply)

Cost and Funding:

Please see the Office of Graduate Studies web page (pdx.edu/ogs/financing-your-education) for information regarding the cost of attending Portland State University and sources of funding. Several forms of departmental graduate support are available, including, but not limited to, Teaching Assistantships and Scholarships. The Department may be contacted for further details. Applicants desiring a teaching assistantship should apply to the graduate program by February 1st for entry the following fall quarter.

Program Requirements:

Below is an overview of the program. For additional details please read the Ph.D. Supplemental Rules (available on the department web site and in the office) and the general rules in the University Bulletin (pdx.edu/academic-affairs/psu-bulletin).

I. Planning a Ph.D. in Mathematical Science Program:

Upon admission to the program the student will be assigned an Advisory Committee to supervise the student's exam schedule and program of courses. This includes an allied area advisor. After satisfactory completion of the comprehensive examinations, a doctoral committee headed by a thesis advisor will be appointed to supervise the remainder of the student's program. The Office of Graduate Studies has a summary of the procedures for doctoral degrees on their website: pdx.edu/ogs/procedures-doctoral-degrees.

II. Course Requirements:

Note: Students whose undergraduate preparation is deemed inadequate by the Ph.D. Committee may be required to take specified undergraduate courses to remedy deficiencies. These courses would not count toward a graduate degree.

Students whose highest degree in mathematics or related fields is a bachelor's degree – a minimum of 99 credit hours beyond a bachelor's degree distributed as follows:

63 credits - Approved graduate level courses

Out of these 63 credits:

- 45 cr. minimum - Mathematics and Statistics courses of which at least 10 courses are at the 600 level
- 15 cr. minimum - Allied area (4 course minimum at the 500 and 600 level)
- 9 credits - Doctoral seminar/Internship (MTH 607)
- 27 credits - Dissertation (MTH 603)

Students entering with a master's degree in mathematics or related fields – a minimum of 72 credit hours beyond a master's degree distributed as follows:

36 credits – Approved graduate level courses
Out of these 36 credits:

- 18 cr. minimum - Mathematics and Statistics courses at the 600 level
- 15 cr. minimum - Allied area (4 course minimum at the 500 and 600 level)
- 9 credits - Doctoral seminar/Internship (MTH 607)
- 27 credits- Dissertation (MTH 603)

The student will be expected to participate in colloquia and research seminars offered by the department. When the Ph.D. Committee determines that the student has developed an adequate background in mathematics, it will recommend that the student take written and oral comprehensive examinations.

III. Examinations:

Preliminary examination: Before the end of the second year after enrolling in this program those students entering the program without a master's degree in Mathematics will be required to take preliminary examinations. These are primarily intended as diagnostic examinations. Students must perform satisfactorily on two examinations, one of which must be in Algebra or in Analysis. The Ph.D. Committee will use the results in the development of a program for students who perform satisfactorily on this exam.

Comprehensive examinations: All students must perform satisfactorily in three written examinations in mathematics or statistics. As appropriate, students will take either a written examination in an allied area or complete a research practicum approved by the Ph.D. Committee in the allied area.

In the case of an allied area examination the four examinations shall be based on the content of a minimum of 20 graduate courses approved by the Ph.D. Committee with each individual examination based on the content of a minimum of 4 graduate courses. The courses in each Mathematical Sciences subject area examination shall include at least one 600 level sequence.

In the case of an approved allied area practicum the three mathematical examinations and the practicum shall be based on the content of a minimum of 20 graduate courses. The mathematical examinations shall be based on the content of a minimum of 14 graduate courses. The courses in each Mathematical Sciences subject area examination shall include at least one 600 level sequence.

In addition, the student must take an oral examination following the written examinations.

Students must successfully complete a Final Oral Examination consisting of a presentation and public defense of the student's dissertation to be held following completion of work.

IV. Dissertation:

As soon as the student successfully completes course, language, and examination requirements, a major advisor, an allied area advisor, and a Doctoral Committee is then assigned to the student to guide research. The dissertation must constitute a substantial contribution to knowledge.

V. Advancement to Candidacy:

Upon recommendation of the Doctoral Committee, the student is recommended for advancement to candidacy for the degree of Doctor of Philosophy.

VI. Residency:

A minimum of three consecutive terms in this program must be spent in full-time residence at Portland State University.