

Mathematics

Department Information

- **Department Chair:**
Friedrich Littmann, Ph.D.
- **Graduate Coordinator:**
Torin Greenwood, Ph.D.
- **Department Location:**
408 Minard Hall
- **Department Phone:**
(701) 231-8171
- **Department Web Site:**
www.ndsu.edu/math (<http://www.ndsu.edu/math/>)
- **Application Deadline:**
Early review begins January 31 rolling through March 31 or until full.
- **Credential Offered:**
Ph.D., M.S.

The Department of Mathematics offers graduate study leading to the degrees of Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). Advanced work may be specialized among the following areas:

- algebra, including algebraic geometry, commutative algebra, and homological algebra
- analysis, including approximation theory, ergodic theory, harmonic analysis, and operator algebras
- applied mathematics, mathematical biology, differential equations, dynamical systems, neural networks
- combinatorics and graph theory
- geometry/topology, including differential geometry, geometric group theory, and symplectic topology

After passing their preliminary examinations, students are strongly urged to attend research seminars and discuss research opportunities with faculty members. By the end of their second semester, students select a supervisory committee and develop a plan of study specifying how all degree requirements are to be met. One philosophical tenet of the Department of Mathematics graduate program is that each mathematics graduate student will be well grounded in at least two foundational areas of mathematics. To this end, each student's background will be assessed, and the student will be directed to the appropriate level of study.

The Department of Mathematics graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate College requirements (<http://catalog.ndsu.edu/past-bulletin-archive/2024-25/graduate/admission-information/>), applicants must

- have earned a cumulative grade point average (CGPA) of at least 3.0 or equivalent in all advanced mathematics courses at the baccalaureate level and
- meet the English proficiency requirements (<http://catalog.ndsu.edu/past-bulletin-archive/2024-25/graduate/admission-information/#internationalapplicantstext>) for applicants.

Financial Assistance

Teaching assistantships and a small number of research assistantships are available. In addition to the stipend, graduate assistants receive a graduate tuition waiver. Tuition waivers cover base tuition for NDSU graduate credits only. Students are responsible for differential tuition, student fees, and tuition for non-graduate level credits taken or Cooperative Education credits.

To be eligible for a teaching assistantship, students must follow the English Language Proficiency Procedure for Graduate Teaching Assistants (<https://catalog.ndsu.edu/graduate/graduate-school-policies/english-language-proficiency-procedure/#text>) and be admitted in full-standing. In certain situations, students in conditional status may be eligible for assistantships.

Assistantship applications will be considered at any time. However, opportunities are improved for those received by March 1 preceding the fall semester of intended enrollment.

At least one year of academic work must be spent in residence at NDSU in fulfilling graduate requirements for each graduate degree earned. The M.S. customarily takes two years to complete; the Ph.D. usually last three years beyond the master's. Students must maintain a cumulative GPA of at least 3.0 throughout their graduate career.

Master of Science

The Master of Science degree is offered in two options: the Plan A Thesis Option or the Plan B Comprehensive Study Option. The Thesis Option emphasizes research and preparation of a scholarly thesis, whereas the Comprehensive Study Option emphasizes a broader understanding of a major area of mathematics.

Departmental Requirements

At least 30 credit hours in approved graduate-level mathematics course work, depending on the degree option.

1. Thesis Option: At least 6 credit hours of MATH 798 Master's Thesis, in addition to at least 18 credit hours in courses numbered 700-789. These 18 credit hours must include six foundational courses. A grade of Master's Pass in two of the written preliminary examinations offered by the department. A thesis paper written under the supervision of a faculty member and defended at an oral examination administered by the student's supervisory committee.
2. Comprehensive Study Option: At least 2 credit hours of MATH 797 Master's Paper in addition to at least 24 credit hours in courses numbered 700-789. These 24 credit hours must include six foundational courses. Subject to the approval of the supervisory committee, at most 6 of the required 30 credits may be earned in 600-level mathematics courses or in courses outside the Mathematics department. A grade of Master's Pass in two of the written preliminary examinations offered by the department. An expository paper written under the supervision of a faculty member and defended at an oral examination administered by the student's supervisory committee.
3. Exam Only Option: At least 30 credit hours in approved graduate-level mathematics course work. At least 21 credit hours in courses numbered 700-789, 800-889. These 21 credit hours must include six foundational courses. Subject to the approval of the supervisory committee, at most 6 of the required 30 credits may be earned in 600-level mathematics courses or in courses outside the Mathematics Department. A grade of Ph.D. Pass in four of the written preliminary examinations offered by the department, and a passing grade in a preliminary oral examination administered by the student's supervisory committee after completion of the written preliminary examinations.

Master of Science

See information in Graduate Bulletin

Accelerated Master of Science

Code	Title	Credits
600-level electives		
Select from mathematics courses numbered 600-689.		15
700 / 800-level electives		
Select from mathematics courses numbered 700-789 or 820-889.		15
Paper requirement		
MATH 797	Master's Paper	3
Total Credits		33

Students must meet all requirements of the Mathematics bachelor program. For the master's degree, students must earn at least 30 graduate credits.

- Up to 15 credits from the above list may count toward the bachelor program requirements.
- A thesis or expository paper will be completed under supervision of a mathematics faculty member and defended at an oral examination administered by the student's supervisory committee
- Students need to earn a B in any of the courses that count towards this program. Failure to do so will lead to removal from the program. After removal, students are not eligible to re-apply to the accelerated program but may apply to the regular graduate program.

Timelines

Per departmental policy candidate has three calendar years from the time of enrollment in the Graduate College to complete the Master's degree. Extensions may be granted after review and approval by the graduate committee.

Doctor of Philosophy

The Doctor of Philosophy degree is awarded in recognition of high scholarly attainment as evidenced by a period of successful advanced study, the satisfactory completion of prescribed examinations, and the development of an acceptable dissertation covering a significant, original aspect of mathematics.

Code	Title	Credits
Foundational Courses		
Algebra		

MATH 720	Algebra I	3
MATH 721	Algebra II	3
MATH 726	Homological Algebra	3
Analysis		
MATH 750	Analysis	3
MATH 754	Functional Analysis	3
MATH 756	Harmonic Analysis	3
Applied Mathematics		
MATH 760	Ordinary Differential Equations I	3
MATH 784	Partial Differential Equations I	3
Combinatorics		
MATH 736	Enumerative Combinatorics	3
MATH 737	Algebraic Combinatorics	3
Geometry/Topology		
MATH 746	Topology I	3
MATH 747	Topology II	3
Graduate Seminar		3
MATH 790	Graduate Seminar	
Doctoral Research		6
MATH 899	Doctoral Dissertation	

- Subject to the approval of the supervisory committee, at most 12 of the required 42 credit hours may be earned in 600-level mathematics courses or in courses outside the Mathematics Department. Credits used to satisfy the requirements of a master's degree at NDSU may be included in the 90 credits hours required for the doctoral degree
- Ph.D. A student entering the doctoral program with a master's degree from another institution need only complete 60 credit hours to complete the Ph.D. degree. Half of these 60 credits must be in courses numbered 700-789.
- A grade of Ph.D. Pass in four written preliminary examinations offered by the department.
- A passing grade in a preliminary oral examination administered by the student's supervisory committee after completion of the Preliminary Examinations.
- A dissertation consisting of a written presentation of original and significant research completed by the student under the supervision of a faculty member and defended at an oral examination administered by the candidate's supervisory committee.

Timelines

Ph.D. students have through the January Preliminary Exams during their third year in the program to demonstrate proficiency in basic areas of mathematics by passing the written Preliminary Examinations. In the Spring semester of the third year the department committee will meet to discuss any candidates who have not completed their written preliminary examinations and make one of three recommendations:

1. If the students have earned a master's pass on two exams, then they will be granted an additional year in the program to complete a Master's degree. Whether they are able to complete the Master's degree or not they will be removed from the program after the additional year.
2. If the committee determines that the student is not making adequate progress, the student's funding (if any) will terminate at the end of the academic year, and they will have one year to complete a Master's degree. Whether they are able to complete the Master's degree or not they will be removed from the program after the additional year.
3. If the committee determines that an extension of the timeline is appropriate, then written notice will be given outlining what the student must accomplish by a specified date to continue receiving funding and/or remain in the program

Azer Akhmedov, Ph.D.

Yale University, 2004

Research Interests: Group Theory, Low Dimensional Topology

Maria Angeles Alfonseca, Ph.D.

Universidad Autonoma de Madrid, Spain, 2003

Research Interests: Fourier Analysis, Partial Differential Equations

Nikita Barabanov, Ph.D.

University of Kiev, 1979

Research Interests: Differential Equations, Control Theory, Optimization, Neural Networks

Jason Boynton, Ph.D.

Florida Atlantic University, 2006

Research Interests: Algebra

Catalin Ciuperca, Ph.D.

University of Kansas, 2001

Research Interests: Commutative Algebras, Algebraic Geometry

Dogan Comez, Ph.D.

University of Toronto, 1983

Research Interest: Ergodic Theory, Measureable Dynamics, Operator Theory

Josef Dorfmeister, Ph.D.

University of Minnesota, 2009

Research Interests: Symplectic Topology

Torin Greenwood, Ph.D.

University of Pennsylvania, 2015

Research Interests: Combinatorics

Friedrich Littmann, Ph.D.

University of Illinois, Urbana-Champaign, 2003

Research Interests: Approximation Theory, Analytic Number Theory

Artem Novozhilov, Ph.D.

Moscow State University of Communication Means, 2002

Research Interests: Mathematical Biology

Tim Ryan, Ph.D.

University of Illinois at Chicago, 2016

Research Interests: Algebraic Geometry

Janet Page, Ph.D.

University of Illinois at Chicago, 2018

Research Interests: Commutative Algebra and Algebraic Geometry

Jessica Striker, Ph.D.

University of Minnesota, 2008

Research Interests: Enumerative, Algebraic, Geometric and Bijective Combinatorics

Abraham Ungar, Ph.D.

Tel-Aviv University, 1973

Research Interests: Differential Equations, Integral Transforms, Wave Propagation, Special Relativity