MATHMATICS (Ph.D.)

Executive Officer: Professor Linda Keen
The Graduate Center
365 Fifth Avenue
New York, NY 10016
Email: Mathematics@gc.cuny.edu
http://Math.gc.cuny.edu

FACULTY

Arthur W. Apter
Sergei Artemov
Alberto Baider
Ara Basmajian
Jason Behrstock
Martin Bendersky
Abhijit Champanerkar
Alex Chigogidze
Gautam Chinta
Richard C. Churchill
Sean Cleary
Józef Dodziuk
Alfred Dolich
Brooke Feigon
Edgar H. Feldman
David R. Finston
Melvin Fitting
Antonia Földes
Gunter Fuchs
Alexander Gamburd
Frederick P. Gardiner
Olympia Hadjiliadis
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THE PROGRAM

The Ph.D. Program in Mathematics provides students of high ability and strong preparation with an opportunity to begin study for the doctoral degree either immediately upon graduation from college or after completing some graduate work in the colleges of the City University or at other accredited institutions. Doctoral work in mathematics is offered at the Graduate Center.

The program is designed to give students the background they will need to pursue careers as pure or applied mathematicians, including courses, seminars, and the completion of an original thesis. The student can specialize in and write a dissertation on a wide range of mathematical subjects. These currently include algebraic topology, analysis on homogeneous spaces, applied analysis, automata, combinatorics, complexity theory, computability, ordinary and partial differential equations, differential geometry, digital signal processing, dynamical systems, fluid dynamics, formal languages, global analysis, group theory, Lie groups, logic, matroids, number theory, optimization, probability, real and complex analysis, Riemann surfaces. The student body is small enough to facilitate close contact with the staff.

En-route M.A.

Upon completing 45 credits with a grade of B or better with no more than 12 of these being transfer credits and successful passage of one of the subject examinations of our qualifying examination suite, students may apply for an M.A. degree.

SPECIAL REQUIREMENTS FOR ADMISSION

In addition to meeting the general University requirements stated earlier in this bulletin, applicants are expected to present a substantial program of elective courses beyond calculus and
must satisfy the Admissions Committee on the basis of their records in mathematics courses and letters of recommendation from instructors familiar with their work that they show promise of ability to complete the requirements for the Ph.D.

**SPECIAL REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY**

In addition to the general University requirements stated earlier in this bulletin, the student must meet the following requirements.

*Course of Study* Each student must follow a plan of study, approved by a faculty adviser, that usually includes three years of course and seminar work. A minimum of 81 graduate credits of course work are required for the degree, at least 60 of which must be in mathematics; the rest may be in closely related fields. At least 36 of the 60 credits in mathematics must be in nonintroductory courses or seminars.

*First Examination* Students should pass their First Examination within the first two years of graduate study. When this is not done, notices will be sent informing them that they must complete their First Examination by the end of the next academic year in order to maintain their matriculated status. In extraordinary cases, which must be presented in writing to the Executive Committee, additional time may be granted at the discretion of the Executive Committee.

*Foreign Language* The candidate must demonstrate ability to read the literature of mathematics in two of the following languages: French, German, and Russian. Substitution of other foreign languages may be permitted in special cases. Students must demonstrate the required proficiency in one of these languages before they complete their second year of study and in the second language before graduation.

*Second Examination* After passing the First Examination, the student specializes in some area of advanced mathematics. A faculty committee will be appointed to help the student arrange a program of study in an area of special interest. When this program of study is completed, the student takes an oral examination given by the faculty to determine readiness to pursue dissertation research.

*Dissertation* Each student must complete a dissertation embodying the results of original research in mathematics. The dissertation is usually written in a field of specialization recommended by the candidate’s sponsor and approved by the faculty. The completed dissertation must be approved by the faculty and must be defended at an oral examination.

**Courses**

Unless otherwise stated, the following courses are 45 hours plus conferences, 4-1/2 credits.

- **MATH 70100-70200** Functions of a Real Variable
- **MATH 70300-70400** Functions of a Complex Variable
- **MATH 70500-70600** Algebra
- **MATH 70700-70800** Topology
- **MATH 70910-70990** Problem Seminar

*Hours and credits to be announced when given.*

Courses in this number series are intended to serve as an introduction to mathematical research and will be focused on problems at a level of difficulty suitable for qualified first-year graduate students. Permission of the instructor is required.

**Special Topics Courses**

A variety of courses will be offered in special areas, number of credits and hours to be announced when scheduled. Appropriate prerequisites will be indicated for each course when it is given.

- **MATH 71000-71400** Topics in Set Theory and Logic
- **MATH 71500-71900** Topics in Applied Analysis
- **MATH 80000-80900** Topics in Euclidean, Hilbert, and Banach Spaces
- **MATH 81000-81900** Topics in Complex Variables
- **MATH 82000-82900** Topics in Topology
- **MATH 83000-83900** Topics in Probability, Stochastic Processes and Distributions
MATH 84000-84900* Topics in Optimization
MATH 85000-85900 Topics in Differential and Integral Equations
MATH 86000-86900 Topics in Differentiable Manifolds
MATH 87000-87900 Topics in Groups, Rings and Algebras
MATH 88000-88400 Topics in Algebraic Groups and Lie Groups
MATH 88500-88900 Seminars in Special Fields
  Two seminars are required for the Ph.D. degree.
MATH 89000-89800 Advanced Seminars in Special Fields
  One such seminar is required for the Ph.D.
MATH 89910-89921 Independent Research
  Variable credit
  Research for the doctoral thesis requires permission of a faculty supervisor and approval by the Executive Officer.
MATH 90000 Dissertation Supervision

*offered infrequently