Mathematics Department

Chairperson
Alexander Kirillov, Mathematics Building 5-116 (631) 632-8290
Lynne Barnett (ATC), (631) 632-8260

Graduate PhD Program Director
Mark McLean, Mathematics Building 3-112 (631) 632-8351

MA Masters Program Director
Marco Martens, Mathematics Building Room 4-113 (631) 632-4893

Mathematics Education Program Director
Lisa Berger, Mathematics Building 4-100A (631) 632-8278

Graduate Administrator
Christine Gathman Mathematics Building P-143 (631) 632-8250

Degrees Awarded
M.A. in Mathematics 7-12; M.A. in Mathematics; Ph.D. in Mathematics

Application
http://www.math.stonybrook.edu/applying-phd-program

Mathematics Department

The Department of Mathematics, in the College of Arts and Sciences, offers degree programs leading to the M.A. in Mathematics (Secondary Teacher Option), the M.A. in Mathematics, and the Ph.D. in Mathematics. The mathematics graduate program is currently ranked 16th in the world by Shanghai Rankings, ranked 26th in the US by the U.S. News, while U.S. News ranks the department 10th in the US in Topology and 5th in the US in Geometry.

The Department’s research and educational missions are considerably enhanced by its close collaboration with the Simons Center for Geometry and Physics and the Institute for Mathematical Sciences. While these two research institutes function as independent entities, their faculty members may, when appropriate, teach courses or supervise students under the department’s auspices.

Ph.D. Program (with Professional-Option M.A. Track)
The Mathematics Ph.D. program is internationally prominent and highly reputed, with a very selective admission process. The program prepares the students for a career in mathematical research and university teaching, while the skills learned enable many of the graduates to pursue highly successful careers in financial, software, and other industries.

Students admitted to the Ph.D. program may also choose to be considered for our Professional Option MA degree. By itself, a Master’s degree of this type qualifies the recipient for many careers, including teaching at the community-college level.

Master of Arts in Teaching Mathematics 7-12
This is a 42-credit master's program, administered by the School of Professional Development, designed for students who already have a bachelors degree in mathematics or the equivalent, and who wish to teach mathematics in grades 7-12. Individuals interested in this program should refer to the School of Professional Development (SPD) online Bulletin: www.stonybrook.edu/spd/graduate/matmath

Combined Bachelors/Masters (BS/MAT) in Teaching Mathematics 7-12
Individuals interested in this program should refer to the School of Professional Development (SPD) online Bulletin: www.stonybrook.edu/spd/graduate/matmath

The M.A. Program: Secondary Teacher Option
The Secondary Teacher Option is a 30 credit two-year, part-time program designed for secondary school mathematics teachers who are seeking permanent certification. The nine required courses in the program are given in the evenings and in the summer on a rotating basis; each required course is offered at least once every two and a half years.

Admission Requirements of the Mathematics Department of the Ph.D. Program (with Professional-Option M.A. Track)
In addition to the Graduate School requirements, the minimum requirements for admission to this program are:

A. A bachelor’s degree with a major in mathematics, or the equivalent.

B. Evidence that the student is likely to succeed. This must include three letters of recommendation from mathematicians (usually from present or former teachers). The breadth and depth of mathematics courses taken, and performance, in these courses will also be carefully considered.

C. Non-native speakers of English must demonstrate an adequate command of the English language, as evidenced by an acceptable score on the TOEFL examination. A paper-based score of 550, computer-based score of 213, or an iBT-based score of 90 would be considered minimally satisfactory for this purpose. The TOEFL exam will be waived only for native speakers of English or, in rare cases, for students whose previous education was conducted almost entirely in English.
D. Acceptance by both the Department of Mathematics and the Graduate School.

Admission Requirements of the M.A. Program: Secondary Teaching Option

In addition to the Graduate School requirements, the minimum requirements for admission to this program are:

A. A bachelor’s degree.

B. Two years of college-level mathematics, including one year of single variable calculus, one semester of linear algebra, and one additional semester of mathematics beyond single variable calculus.

C. Provisional New York State Certification for Teaching Mathematics, Grades 7-12.

D. A grade point average of at least 3.0 in all calculus and post-calculus mathematics courses.

E. Evidence that the student is likely to succeed: this usually consists of three letters of recommendation from former teachers or supervisors.

F. Acceptance by both the Department of Mathematics and the Graduate School.

Facilities of the Mathematics Department

Since the beginning of the modern department under the leadership of Jim Simons, Stony Brook has been world-renowned as a center of research in geometry broadly interpreted. With the opening of the Institute for Mathematical Sciences, headed by its inaugural director John Milnor, dynamics emerged as an additional area of excellence. In more recent times, these traditional strengths have broadened, and the department now has multiple active research groups, numerous weekly seminars, and regularly organizes conferences, graduate schools, and other events.

The distinguished faculty of the mathematics department include 1 Abel prize winner, 2 Fields Medal laureates, 7 members of the National Academy of Science (Mathematics), 16 past speakers of International Congresses of Mathematicians, and recipients of multiple international awards. The current active research areas include algebra, dynamics, representation theory, complex analysis, algebraic geometry, geometric function theory, differential geometry, topology, geometric analysis, mathematical physics, symplectic geometry.

There are weekly research seminars in differential geometry, dynamics, algebraic geometry, topology, and a departmental colloquium, as well as a professional development seminar and graduate student seminar. The department currently has a research and training (RTG) grant in geometry, interpreted in the broadest possible sense.

Institute for Mathematical Science

The IMS is another active center of research, closely aligned with the mathematics department, and headed by its codirectors Mikhail Lyubich and John Milnor. Many of the research activities of the Institute are centered around dynamics. The Institute has an active post doctoral program, and weekly research and learning seminars in dynamics, broadly interpreted. IMS hosts many visitors and regularly organizes research events.

Simons Center for Geometry and Physics

The Simons Center for Geometry and Physics (SCGP), a major international research center located next door to the department has greatly enhanced the scientific life of the department since its opening in 2007. The mathematics faculty of the center also hold appointments and they supervise PhD students in the mathematics department. The center hosts 12 post-docs divided between mathematics and physics. It runs many international workshops in mathematics (not just geometry) and theoretical physics every year, attracting leading researchers from around the world: over 1000 scientists visit each year. In addition, the SCGP and the Math Department run a collaborative research and training program funded by the NSF. The abundant activities of the center are open to the community, the mathematics department, and graduate students are encouraged to attend the talks that are of relevance for their research.

Requirements of the MA Degree in Mathematics

The M.A. degree in the Department of Mathematics requires the satisfactory completion of a minimum of 30 graduate credits in letter-graded (A, B, C, F) graduate courses. All credits in satisfaction of the degree must be at the graduate level. In addition, the cumulative grade point average for all courses taken must be 3.0 or higher. Students may select from the M.A. Professional option or the M.A. Secondary Teacher option. The M.A. Secondary Teacher option is designed for provisionally certified teachers of mathematics in grades 7-12. Students who are not currently certified teachers of mathematics should consult the M.A.T. program through the School of Professional Development.

Core Requirements for the M.A. Degree Professional Option

1. Satisfactory completion of four of the following courses (12 credits).
   - MAT 530 Topology, Geometry I* or MAT 540 Advanced Topology, Geometry I/MAT 531 Topology, Geometry II*
   - MAT 532 Real Analysis I*/MAT 533 Real Analysis II*
   - MAT 534 Algebra I*/MAT 535 Algebra II*
   - MAT 536 Complex Analysis I*

Note: Courses listed next to each other should be viewed as a sequence, and students should complete at least one of the sequences. Each course is 3 credits.
2. Master’s Thesis or Comprehensive Examination: Up to six credits of Master’s Thesis (enrollment in MAT 599). Students will work with an advisor to write a paper on a significant topic of mathematics. It need not be original research.

Alternatively, students may choose to pass either the PhD comprehensive examination, or the separate MA comprehensive exam. The MA comprehensive exam consists of the final examinations in MAT 530/540, MAT 531, MAT 532, MAT 533, MAT 534, MAT 535, and MAT 536, or the equivalent. If students choose the comprehensive examination option, they will enroll in an additional 6 credits of coursework (see below) for a total of at least 30 credits for degree completion.

3. 12-18 credits of additional coursework (for a total of 30 credits for completion of the degree program): To complete the 30 credits, students may enroll in any MAT course in the Mathematics department numbered 500 or above except MAT 598. With the permission of the Director of the Program, students may substitute courses related to mathematics from AMS, PHY, or other departments.

Core Requirements for the M.A. Degree Secondary Teacher Option

1. Satisfactory completion of the following nine courses (27 credits):
   - MAT 511 Fundamental Concepts of Mathematics
   - MAT 512 Algebra for Teachers
   - MAT 513 Analysis for Teachers I
   - MAT 514 Analysis for Teachers II
   - MAT 515 Geometry for Teachers
   - MAT 516 Probability and Statistics for Teachers
   - MAT 517 Calculators and Computers for Teachers
   - MAT 519 Seminar in Mathematics Teaching
   - MAT 520 Geometry for Teachers II

2. Elective Course (3-4 credits). One course selected from the following (other courses may be substituted with permission of the Director of the Program):
   - AMS 593 Mathematical Theory of Interest
   - BEE 552 Biometrics
   - CEB 555 History of Science Education
   - CEI 589 Technology and the Classroom
   - CEM 570 Manipulatives and Mathematics
   - EST 563 Computational Literacy
   - EST 565 Instructional Technologies
   - MBA 504 Financial Accounting
   - PHY 570 Introduction to Physics for Teachers
   - PHY 576 Thermodynamics for Teachers
   - PHY 578 Quantum Physics for Teachers

Requirements for the Ph.D. Degree

In addition to the requirements of the Graduate School, the following are required:

A. Passing the doctoral comprehensive examination.

B. Passing the doctoral preliminary examination.

C. Demonstrating proficiency in reading mathematics in two relevant foreign languages, usually French, German or Russian. Non-English-speaking international students can demonstrate their proficiency in one of these languages, in addition to their native language.

D. Advancement to candidacy.

E. Writing an acceptable dissertation.

F. Two consecutive semesters of full-time study.

Doctoral Comprehensive Examination

This examination, which is offered twice a year (just before the start of each semester), is designed to test mastery of the fundamentals of mathematics. This exam is based on the syllabi of the core courses; MAT 530, MAT 531, MAT 532, MAT 533, MAT 534, MAT 535, MAT 536. Students who transfer from graduate programs at other universities may, in some cases, be granted exemption from this requirement.

Doctoral Preliminary Examination

This examination is oral. Each student must take this examination no later than 1 ½ years after passing the comprehensive examination or receiving an exemption therefrom. The chairperson and one additional member of the examining committee are chosen by the student; one additional member is chosen by the program.

Professional Academic Training Program
All full-time graduate students are required to participate in this program, consisting of supervised teaching/tutoring at the lower undergraduate levels.

Faculty of the Mathematics Department

Professors


Ebin, David  4, Ph.D., 1967, Massachusetts Institute of Technology: Global analysis, Continuum Mechanics, Partial Differential Equations.


Grushevsky, Samuel  7,9, Ph.D. 2002 Harvard University: Complex Geometry, Several Complex Variables.


Kirillov Jr., Alexander, Undergraduate Program Director, Ph.D., 1995, Yale University: Representation Theory, Low Dimensional Topology, Mathematical Physics.


Lyubich, Mikhail  4,7,8, Director of Institute for Mathematical Sciences, Ph.D., 1983, Tashkent State University, Russia: Dynamical Systems, Kleinian Groups and their Deformation Spaces.

Martens, Marco, MA Masters Professional Option Program Director Ph.D., 1990, Delft University, The Netherlands: Dynamical Systems.

Michelsohn, Marie- Louise, Ph.D., 1974, University of Chicago: Differential Geometry.

Milnor, John W.  1,2,3,4,7,8, Co-Director of Institute for Mathematical Sciences, Ph.D., 1954, Princeton University: Dynamical Systems Topology, Geometry.

Schnell, Christian, Ph.D., 2008 Ohio State University: Algebraic Geometry.

Plamenevskaya, Olga, Undergraduate Program Associate Director, Ph.D., 2004, Harvard University: Contact and Symplectic Geometry, Low-Dimensional Topology.

Schul, Raanan Ph.D., Associate Graduate Program Director 2004 Harvard University: Real Analysis, Geometric Measure Theory.


Starr, Jason Ph.D., 2000 Harvard University: Algebraic Geometry.


Sutherland, Scott  6,8, Undergraduate Program Director Ph.D., 1989, Boston University: Dynamical Systems, Computing.

Takhtajan, Leon,  4, Ph.D., 1975, Leningrad Branch of the Steklov Mathematical Institute, Russia: Mathematical Physics and Applications to Complex and Algebraic Analysis.


**Associate Professors**
Berger, Lisa, Mathematics Education Program Director, Ph.D., 2007, University of Arizona: Number Theory, Mathematics Education of Teachers.

Chas, Moira, Ph.D., 1998, Universidad Autónoma de Barcelona: Geometric Topology, Dynamical Systems.

McLean, Mark, Graduate Director, Ph.D., 2008 Cambridge University: Algebraic Geometry; Differential Geometry, Symplectic Topology.

Movshev, Michael, Ph.D., 1997, University of Pennsylvania: Algebra

**Assistant Professors**


Dudko, Dzmitry, Ph.D. 2012 Jacobs University: Dynamical Systems


Ntalampekos, Dimitrios, Ph.D., 2018 University of California Los Angeles: Analysis on metric spaces, Quasiconformal mappings Complex Analysis, Metric geometry.

**Research Assistant Professors**
Kamenova, Ljudmila, Ph.D., 2006: Massachusetts Institute of Technology: Complex Geometry.

**James H. Simons Instructors**
Lee, Eun Hye, Ph.D., 2019 University of Chicago: Number Theory, Automorphic forms and representations

Kotelskiy, Artem, Ph.D., 2018 Princeton University: Low-dimensional topology and symplectic geometry

Martin, Olivier, Ph.D., 2020 University of Chicago: Algebraic Geometry.

Wang, Jian, Ph.D., 2019 Universite Grenoble Ales: Differential Geometry

**Gromoll Instructor**
Lin, Peter, Ph.D., 2019 University of Washington: Complex Analysis and Probablility

**Ronald Douglas Instructor**
Romney, Matthew, Ph.D., 2017 University of Illinois at Urbana Champaign: Geometric function theory and analysis on metric spaces.

**RTG Postdoctoral Fellow**
Erchenko, Alena, Ph.D., 2018 The Pennsylvania State University: Dynamical systems and ergodic theory

Hanlon, Andrew, Ph.D., 2019 University of California, Berkeley: Symplectic topology and homological mirror symmetry

Sackel, Kevin, Ph.D., 2019 MIT: Symplectic and contact topology and geometry

**Lecturers**
Abd-el-hafez, Alaa, Ed.D., 2015 LIU Brookville, NY: Interdisciplinary Educational Studies, Director of Field Experience and Clinical Practice


Christiane Stidham, Ph.D., 1999 University of California: Tectonic and Structural modeling and simulations of earthquake wave propagation.

Wertz, Debra, MA., 2009 Teaching Mathematics 7-12

**Institute for Mathematical Sciences**
Lyubich, Mikhail, Ph.D., 1983, Tashkent State University, Russia: Dynamical Systems.


**Institute for Mathematical Sciences, Lecturers**
Karafyllia, Christina, Ph.D., 2020 University of Thessaloniki, Greece: Conformal invariants and the Hardy number of conformal maps.

Luo, Yusheng, Ph.D., 2019 Harvard University: Trees, Berkovich spaces and the barycentric extension in complex dynamics.

Nie, Hongming, Ph.D., 2018 Indiana University: Dynamical systems and ergodic theory

Yang, Jonguk, Ph.D., 2017 University of Toronto, Canada: Applications of Renormalization to Irrationally Indifferent Complex Dynamics.
Waterman, James, PhD., 2020 The Open University: Dynamical systems and ergodic theory
Zhao, ShengYuan, Ph.D., 2020, Université de Rennes I, Campus De Beaulieu, France: complex algebraic geometry and holomorphic dynamical systems.

**Visitors**

**Professors Emeriti**
Morgan, John 39, Ph.D., 1969, Rice University: Topology of Manifolds, Algebraic Geometry, Three and Four Dimensional Manifolds.

1. Abel Prize Winner
2. Fields Medal laureates
3. Member of the National Academy of Science (Mathematics)
4. Speaker of the International Congress of Mathematicians
5. Recipient of the State University President’s and Chancellor’s Award for Excellence in Teaching, 1990
6. Recipient of the State University President’s and Chancellor’s Award for Faculty Service, 2006
7. Distinguished Professor
8. Member, Institute for Mathematical Sciences
9. Member, Simons Center for Geometry and Physics
10. Joint appointment, Applied Mathematics and Statistics

**NOTE:** The course descriptions for this program can be found in the corresponding program PDF or at COURSE SEARCH.