Department of Mathematics

- Faculty
- Field Description
- The Majors and Courses
- The Minor and Courses
- Courses
    - Courses in Mathematics (MTH)
- Department of Mathematics Web Site

The Faculty

Chair: Warren B. Gordon

University Distinguished Professor:

- Arthur Apter

Presidential Professor:

- Jim Gatheral

Professors:

- Warren B. Gordon
- Miriam Hausman
- Bruce Jordan
- Laurence Kirby
- Elena Kosygina
- Andrew Lesniewski
- Anita Mayo
- Rados Radoicic
- Alvany Rocha
- Aaron Todd
- Tai-Ho Wang

Associate Professors:

- Louis-Pierre Arguin
- C. Douglas Howard
- Jakob Reich
- Dan Stefanica
- Ingrid-Mona Zamfirescu

Assistant Professors:

- Michael J. Carlisle
- Feng Chen
- Peter Gregory
- Ivan Matic
- Anja Richter
- Adam Sheffer
- Giulio Trigila

Lecturers:

- April Allen-Materowski
- Evan Fink
- Sarah Harney
- Jarrod Pickens
- Timothy Ridenour
- Ryan Ronan
- Elizabeth Stepp

back to top

Field Description

Mathematics has been described as the queen of all sciences. Understanding mathematics enables one to explain and analyze not only science and nature but almost all disciplines from archeology to zoology. Most recently, mathematics has become an indispensable tool in finance and other business related areas. To ensure that mathematics is available for students with varied backgrounds and different professional goals, the department offers courses at all levels. Advanced courses are designed to be taken by mathematics and actuarial science majors and those in related fields.

back to top

The Majors

- Mathematics
- Actuarial Science
- Financial Mathematics

Mathematics

The major in mathematics is designed to enable the student to enter the marketplace (industrial or educational) or to pursue further studies in mathematics or allied fields at the graduate level. Interested students are urged to contact the Department of Mathematics as early as possible. The student will be assigned an advisor who will aid in formulating an appropriate course of study. Students who want to teach mathematics in the secondary schools should consult an advisor in the Center for Advisement and Orientation.

Required Courses All students must take the following three courses:		
MTH 3300	Algorithms, Computers and Programming I	3 credits
MTH 4010	Advanced Calculus I ***effective spring 2018:*** *course title changes to* ***Mathematical Analysis I***	3 credits
MTH 4100	Linear Algebra and Matrix Methods	3 credits
and may take the following course, depending on the *trajectory of their academic career.*		
MTH 4009	Proof Writing for Advanced Calculus *	1 credit

* MTH 4009 Proof Writing for Advanced Calculus is designed for students who want additional exposure to proof writing before enrolling in MTH 4010. **It may be used in the mathematics major only if completed as a prerequisite for MTH 4010, and it is not open to students who have credit for one of the following courses: MTH 4000; MTH 4010; MTH 4200; MTH 4210; MTH 4215; MTH 4220; MTH 4240; or MTH 4315.** **Please consult a faculty advisor in the Department of Mathematics before enrolling in this course.**		
Students may fulfill their calculus requirements by any one of the following three alternate calculus tracks: **Track I:**		
MTH 2610	Calculus I	4 credits
MTH 3010	Calculus II	4 credits
MTH 3020	Intermediate Calculus	4 credits
	or	
MTH 3050	Multi-Variable and Vector Calculus	4 credits
or **Track II:**		
MTH 2630	Analytic Geometry and Calculus I	5 credits
MTH 3030	Analytic Geometry and Calculus II	5 credits
or **Track III:**		
MTH 2205	Applied Calculus	3 credits
	or	
MTH 2207	Applied Calculus and Matrix Applications	4 credits
MTH 3006	Integral Calculus	4 credits
MTH 3030	Analytic Geometry and Calculus II	5 credits
Electives Any four 4000-level or 5000-level courses from the following group:		
MTH 4030	Topology	3 credits
MTH 4020	Advanced Calculus II	3 credits
MTH 4110	Ordinary Differential Equations	3 credits
MTH 4120	Introduction to Probability	4 credits
MTH 4115	Numerical Methods for Differential Equations in Finance	4 credits
MTH 4125	Introduction to Stochastic Process	4 credits
MTH 4130	Mathematics of Statistics	4 credits

MTH 4135	Computational Methods in Probability	3 credits
MTH 4140	Graph Theory	3 credits
MTH 4145	Mathematical Modeling *	3 credits
MTH 4150	Combinatorics	3 credits
MTH 4200	Theory of Numbers	3 credits
MTH 4210	Elements of Modern Algebra	3 credits
MTH 4230	History of Mathematics	3 credits
MTH 4240	Differential Geometry *	3 credits
MTH 4300	Algorithms, Computers and Programming II *	3 credits
MTH 4310	Methods of Numerical Analysis	3 credits
MTH 4315	Introduction to Mathematical Logic	3 credits
MTH 4320	Fundamental Algorithms	3 credits
MTH 4500	Introductory Financial Mathematics	4 credits
MTH 5010	Advanced Calculus III *	3 credits
MTH 5020	Theory of Functions of a Complex Variable*	3 credits
MTH 5030	Theory of Functions of Real Variables*	3 credits
MTH 5100	Partial Differential Equations and Boundary Value Problems*	4 credits
MTH 5500	Stochastic Calculus for Finance	4 credits
* These courses are offered infrequently, subject to student demand.		

back to top

Actuarial Science

The field of actuarial science applies mathematical principles and techniques to problems in the insurance industry. Progress in the field is generally based upon completion of examinations given by the Society of Actuaries. The Baruch College major is designed to prepare students to pass the P, FM, MFE, MLC and C exams offered by the Society of Actuaries. Students interested in this highly structured program are urged to contact the Department of Mathematics as early as possible so that the department may assign an advisor to aid in formulating an appropriate course of study.

Math Program Prerequisites		
Based on placement follow one of the following preliminary calculus options below:		
Option 1:		
MTH 2610	Calculus I	4 credits

MTH 3010	Calculus II	4 credits
or		
Option 2:		
MTH 2205	Applied Calculus	3 credits
MTH 3006	Integral Calculus	4 credits
or		
Option 3:		
MTH 2207	Applied Calculus	3 credits
MTH 3006	Integral Calculus	4 credits
or		
Option 4:		
MTH 3006	Integral Calculus	4 credits
or		
MTH 3010	Calculus II	4 credits
or		
Option 5: *		
MTH 3006	Integral Calculus	4 credits
and		
MTH 3007	Infinite Series	1 credit
And complete one of the following courses:		
MTH 3020	Intermediate Calculus	4 credits
or		
MTH 3030	Analytic Geometry and Calculus II	5 credits
or		
MTH 3050	Multi-Variable and Vector Calculus	4 credits
Business Program Prerequisites		
ACC 2101	Principles of Accounting	

BUS 1000	Introduction to Business **	3 credits
or		
BUS 1011	Business Fundamentals: The Contemporary Business Landscape **	3 credits
CIS 2200	Introduction to Information Systems and Technologies **	3 credits
ECO 1001	Micro-Economics	3 credits
ECO 1002	Macro-Economics	3 credits
STA 2000	Business Statistics **	3 credits

NOTES:

*** Students who completed Option 5 (both MTH 3006 and MTH 3007) may register for MTH 3020 or MTH 3050.**

**** Students who have completed MTH 4120 Introduction to Probability, may be waived from BUS 1000/1011, CIS 2200, and STA 2000. Please consult the Weissman Office of the Associate Dean (WSAS.AssocDean@baruch.cuny.edu; 646-312-3890; NVC 8-265) to request registration permission.**

Required Courses

MTH 3300	Algorithms, Computers, and Programming I	3 credits
MTH 4120	Introduction to Probability ***	4 credits
MTH 4410	Theory of Interest	4 credits
MTH 4500	Mathematical Finance	4 credits
FIN 3000	Principles of Finance	3 credits
FIN 3610	Corporate Finance	3 credits

***** Students who have completed MTH 3120 cannot enroll in MTH 4120. They must satisfy the probability requirement by registering for MTH 4119 as an independent study (please consult the Department of Mathematics).**

Electives

In addition, one course must be chosen from the following list of electives:

MTH 4115	Numerical Methods for Differential Equations in Finance	4 credits
MTH 4125	Introduction to Stochastic Processes	4 credits
MTH 4130	Mathematics of Statistics	4 credits
MTH 4135	Computational Methods in Probability	3 credits
MTH 4420	Actuarial Mathematics	4 credits
MTH 4421	Actuarial Mathematics II	4 credits
MTH 4451	Short-Term Insurance Mathematics *(formerly Risk Theory)*	4 credits
MTH 5500	Stochastic Calculus for Finance	4 credits

The following courses are recommended, but not required. They are not applicable toward the major.
ECO 3100 Intermediate Micro-Economics
ECO 3200 Intermediate Macro-Economics

back to top

Financial Mathematics

This major is first and foremost a course of study in mathematics, with a focus on the computational tools and techniques needed to thrive in the financial engineering industry. In today's specialized world, a sophisticated level of mathematical understanding is an essential competitive edge. As this program includes courses in Economics and Finance, students who would usually not consider a traditional mathematics major will find this program especially attractive. Interested students are urged to contact the Department of Mathematics as early as possible. The student will be assigned an advisor who will aid in formulating an appropriate course of study.

NOTE: Depending on a student's starting mathematics proficiency, this program may require more than 120 credits to complete.		
Mathematics Program Prerequisites:		
As a preliminary requirement, students must complete the calculus requirement, which may be achieved by any one of the following six methods:		
Option 1:		
	Calculus AP Exam (BC) with a score of 4 or 5 *(transfers to Baruch as MTH 2610 and MTH 3010)*	8 credits
MTH 3050	Multi-Variable and Vector Calculus	4 credits
	or	
Option 2:		
	Calculus AP exam (AB) with a score of 4 or 5 *(transfers to Baruch as MTH 2610)*	4 credits
MTH 3010	Calculus II	4 credits
MTH 3050	Multi-Variable and Vector Calculus	4 credits
	or	
Option 3:		
MTH 2610	Calculus I	4 credits
MTH 3010	Calculus II	4 credits
MTH 3050	Multi-Variable and Vector Calculus	4 credits
	or	
Option 4:		
MTH 2205/ MTH 2206	Applied Calculus	3 credits

or		
MTH 2207	Applied Calculus and Matrix Applications	4 credits
***and* the following three courses:**		
MTH 3006	Integral Calculus	4 credits
MTH 3030	Analytic Geometry and Calculus II	5 credits
MTH 3035	Vector Calculus *	1 credit
	or	
Option 5:		
MTH 2205/ MTH 2206	Applied Calculus	3 credits
MTH 2207	Applied Calculus and Matrix Applications	4 credits
***and* the following three courses:**		
MTH 3006	Integral Calculus	4 credits
MTH 3007	Infinite Series	1 credit
MTH 3050	Multi-Variable and Vector Calculus *	4 credits
	or	
Option 6:		
MTH 2630	Analytic Geometry and Calculus I	5 credits
MTH 3030	Analytic Geometry and Calculus II	5 credits
MTH 3035	Vector Calculus *	1 credit
Each option also requires:		
MTH 4000 *	Bridge to Higher Mathematics	4 credits

*** NOTES:**

1. **At least an overall B+ average is required for the calculus courses preceding MTH 3020, MTH 3030 or MTH 3050 in each of the above options.**
2. **MTH 3050 may be replaced with MTH 3020 and MTH 3035 in any of the above options.**
3. **At least a B or better is required in: MTH 3050; or MTH 3020 and MTH 3035; or MTH 3030 and MTH 3035 as appropriate.**
4. **To gain official admission to the program students must complete MTH 4000 with a minimum grade of B.**

Business Program Prerequisites:		
ACC 2101	Principles of Accounting	3 credits

ECO 1001	Micro-Economics	3 credits
ECO 1002	Macro-Economics	3 credits
BSFM students are waived from the following FIN 3000 course prerequisites: BUS 1000/1011; CIS 2200; and STA 2000. Please consult the Weissman Office of the Associate Dean **(WSAS.AssocDean@baruch.cuny.edu; 646-312-3890; NVC 8-265) to request registration permission.**		
Required Finance Courses:		
FIN 3000	Principles of Finance	3 credits
FIN 3610	Corporate Finance	3 credits
Required Upper-level Mathematics Courses:		
MTH 3300	Algorithms, Computers, and Programming I	3 credits
MTH 4100	Linear Algebra	3 credits
MTH 4115	Numerical Methods for Differential Equations	4 credits
MTH 4120	Introduction to Probability *	4 credits
MTH 4125	Introduction to Stochastic Processes	4 credits
MTH 4130	Mathematics of Statistics	4 credits
MTH 4300	Algorithms, Computers, and Programming II	3 credits
MTH 4500	Introductory Financial Mathematics	4 credits
MTH 4600	Data Analysis and Simulation for Financial Engineers	4 credits
MTH 5500	Stochastic Calculus for Finance	4 credits

*** Students who have completed MTH 3120 cannot enroll in MTH 4120. They must satisfy the probability requirement by registering for MTH 4119 as an independent study (please consult the Department of Mathematics).**

back to top

The Minor

The minor in mathematics provides students with a background in the various theories and uses of mathematics. The minor requires the completion of MTH 3006 or MTH 3010 and any other 3- or 4-credit mathematics course numbered 3000 or higher, **with the exceptions of** MTH 3007 and MTH 4009 **(which are not applicable toward the minor).** Students must then complete a capstone course consisting of any mathematics course at the 4000-level or higher **with the exceptions of MTH 4410 (which may not be used as a capstone course).**

back to top

Courses in Mathematics (MTH)

MTH 1030	College Algebra	4 hours; 2 credits
MTH 2003	Pre-calculus and Elements of Calculus	4 hours; 3 credits
MTH 2120	Mathematics Appreciation	3 hours; 3 credits
MTH 2140	Mathematics and Quantitative Reasoning	4 hours; 3 credits
MTH 2160	Ideas in Mathematics and Their Applications	4 hours; 3 credits
MTH 2205	Applied Calculus	4 hours; 3 credits
MTH 2206	Applied Calculus	3 hours; 3 credits
MTH 2207	Applied Calculus and Matrix Applications	4 hours; 4 credits
MTH 2301	Concepts of Discrete Mathematics	3 hours; 3 credits
MTH 2610	Calculus I	4 hours; 4 credits
MTH 2630	Analytic Geometry and Calculus I	5 hours; 5 credits
MTH 3006	Integral Calculus	4 hours; 4 credits
MTH 3007	Infinite Series	1 hour; 1 credit
MTH 3010	Elementary Calculus II	4 hours; 4 credits
MTH 3020	Intermediate Calculus	4 hours; 4 credits
MTH 3030	Analytic Geometry and Calculus II	5 hours; 5 credits
MTH 3035	Vector Calculus	1 hour; 1 credit
MTH 3040	Actuarial Science Theory and Problem Seminar	2 hours; 2 credits
MTH 3050	Multi-Variable and Vector Calculus	4 hours; 4 credits
MTH 3100	Selected Topics in Discrete Mathematics	3 hours; 3 credits
MTH 3120	Elementary Probability	3 hours; 3 credits
MTH 3300	"Algorithms, Computers, and Programming I"	4 hours; 3 credits
MTH 3901	Actuarial Science Internship	1 hour; 1 credit
MTH 3902	Actuarial Science Internship	1 hour; 1 credit
MTH 3903	Actuarial Science Internship	1 hour; 1 credit
MTH 3904	Actuarial Science Internship	1 hour; 1 credit
MTH 3905	Math Internship	1 hour; 1 credit
MTH 3906	Math Internship	1 hour; 1 credit
MTH 3907	Math Internship	1 hour; 1 credit

MTH 3908	Math Internship	1 hour; 1 credit
MTH 3909	Financial Mathematics Internship	1 hour; 1credit
MTH 3910	Financial Mathematics Internship	1 hour; 1credit
MTH 3911	Financial Mathematics Internship	1 hour; 1credit
MTH 3912	Financial Mathematics Internship	1 hour; 1credit
MTH 4000	Bridge to Higher Mathematics	4 hours; 3 credits
MTH 4005	Problem-Solving Seminar	3 hours; 3 credits
MTH 4009	Proof Writing for Advanced Calculus	1 hour; 1 credit
MTH 4010	Advanced Calculus I ***effective spring 2018**: course title changes to **Mathematical Analysis I***	3 hours; 3 credits
MTH 4020	Advanced Calculus II	3 hours; 3 credits
MTH 4030	Topology	3 hours; 3 credits
MTH 4100	Linear Algebra and Matrix Methods	3 hours; 3 credits
MTH 4110	Ordinary Differential Equations	3 hours; 3 credits
MTH 4115	Numerical Methods for Differential Equations in Finance	4 hours; 4 credits
MTH 4119	Multivariate Probability Distributions	1 hour; 1 credit
MTH 4120	Introduction to Probability	4 hours; 4 credits
MTH 4125	Introduction to Stochastic Processes	4 hours; 4 credits
MTH 4130	Mathematics of Statistics	4 hours; 4 credits
MTH 4135	Computational Methods in Probability	4 hours; 3 credits
MTH 4140	Graph Theory	3 hours; 3 credits
MTH 4145	Mathematical Modeling	3 hours; 3 credits
MTH 4150	Combinatorics	3 hours; 3 credits
MTH 4200	Theory of Numbers	3 hours; 3 credits
MTH 4210	Elements of Modern Algebra	3 hours; 3 credits
MTH 4215	"Finite Fields, Algebraic Curves, and Applications"	3 hours; 3 credits
MTH 4230	History of Mathematics	4 hours; 4 credits
MTH 4240	Differential Geometry	3 hours; 3 credits
MTH 4300	"Algorithms, Computers, and Programming II"	4 hours; 3 credits
MTH 4310	Methods of Numerical Analysis	3 hours; 3 credits

MTH 4315	Introduction to Mathematical Logic	4 hours; 3 credits
MTH 4320	Fundamental Algorithms	4 hours; 3 credits
MTH 4340	Switching Theory	3 hours; 3 credits
MTH 4395	Special Topics in Computer Science	3 hours; 3 credits
MTH 4400	Finite Differences	4 hours; 4 credits
MTH 4410	Theory of Interest	4 hours; 4 credits
MTH 4420	Actuarial Mathematics	4 hours; 4 credits
MTH 4421	Actuarial Mathematics II	4 hours; 4 credits
MTH 4451	Short-Term Insurance Mathematics *(formerly Risk Theory)*	4 hours; 4 credits
MTH 4500	Introductory Financial Mathematics	4 hours; 4 credits
MTH 4600	Data Analysis and Simulation for Financial Engineers	4 hours; 4 credits
MTH 5000	Independent Study I	Hours and credits to be arranged
MTH 5001	Independent Study II	Hours and credits to be arranged
MTH 5002	Independent Study III	Hours and credits to be arranged
MTH 5003	Independent Study IV	Hours and credits to be arranged
MTH 5004	Independent Study V	Hours and credits to be arranged
MTH 5010	Advanced Calculus III	3 hours; 3 credits
MTH 5020	Theory of Functions of a Complex Variable	3 hours; 3 credits
MTH 5030	Theory of Functional of Real Variables	3 hours; 3 credits
MTH 5100	Partial Differential Equations and Boundary Value Problems	4 hours; 4 credits
MTH 5500	Stochastic Calculus for Finance	4 hours; 4 credits
MTH 6001H	Honors in Mathematics I	Hours and credits to be arranged
MTH 6002H	Honors in Mathematics II	Hours and credits to be arranged
MTH 6003H	Honors in Mathematics III	Hours and credits to be arranged

back to top