(For students admitted in 2023-24 under the 4-year degree)

BSc in Mathematics

In addition to the requirements of their major programs, students are required to complete the University and School requirements for graduation. For details please refer to the respective sections on this website.

Students may use no more than 6 credits earned from courses offered in self-paced online delivery mode to satisfy the graduation requirements of a degree program. This 6-credit limit does not apply to credits obtained through the credit transfer procedures of the University.

For students graduating with an additional major, they must take all the requirements specified for that major, within which they must complete at least 20 single-counted credits. These 20 credits cannot be used to fulfill any other requirements for graduation except for the 120-credit degree requirement.

Under the new 30-credit Common Core Program which is applicable to students admitted to the University in 2022-23 and thereafter, courses that have been counted towards School and/or Major Requirements are not allowed to be reused for fulfilment of the University Common Core Requirements. Students should look up the details of the Common Core Program including the general and School-/program-specific distributional requirements posted on the Common Core website where the link to it is available on this website.

Major Requirements

Students MUST take the following courses prior to enrollment into the major

Major Pre-requisite course(s)

				Credit(s) attained
MATH			Note: [(MATH 1012 OR MATH 1013 OR MATH 1023) AND (MATH 1014 OR MATH 1024)] OR [MATH 1020] (Students following IRE track can only use MATH 1023 and MATH 1024 to fulfill the requirement)	4-7
	MATH	1012	Calculus IA	4
	MATH	1013	Calculus IB	3
	MATH	1014	Calculus II	3
	MATH	1020	Accelerated Calculus	4
	MATH	1023	Honors Calculus I	3
	MATH	1024	Honors Calculus II	3

Required Course(s)

				Credit(s) attained
MATH	2023		Multivariable Calculus	4
MATH			Note: MATH 2033 OR MATH 2043 [Students following IRE Track or Pure Mathematics (Advanced) Track can only use MATH 2043 to fulfill the requirement.]	4
	MATH	2033	Mathematical Analysis	4
	MATH	2043	Honors Mathematical Analysis	4

MATH			Note: MATH 2121 OR MATH 2131 [Students following IRE Track or Pure Mathematics (Advanced) Track can only use MATH 2131 to fulfill the requirement.]	4
	MATH	2121	Linear Algebra	4
	MATH	2131	Honors in Linear and Abstract Algebra I	4
MATH			Note: MATH 3033 OR MATH 3043 [Students following IRE Track or Pure Mathematics (Advanced) Track can only use MATH 3043 to fulfill the requirement.]	4
	MATH	3033	Real Analysis	4
	MATH	3043	Honors Real Analysis	4
LANG			Note: LANG 3021 OR LANG 3027 (Students following IRE Track should take LANG 3027 to fulfill the requirement.)	3
	LANG	3021	Science Communication in English (Mathematics)	3
	LANG	3027	Science Communication in English for Research Students	3

Track Study

Students should follow one of the tracks and complete all requirements as specified

Applied Mathematics Track

Required Course(s)

				Credit(s) attained
MATH	2352		Differential Equations	4
MATH	2411		Applied Statistics	4
MATH	3312		Numerical Analysis	3
MATH	4052		Partial Differential Equations	3
MATH	4360		Mathematical Modeling	3
MATH			Note: MATH 4992 OR MATH 4999	3
	MATH	4992	Capstone Project in Applied Mathematics	3
	MATH	4999	Independent Capstone Project	3

Elective Course(s)

				Minimum credit(s) required
MATH			MATH Depth Electives (4 courses from the specified elective list)	12
	MATH	2001	Foundation of Mathematics	2
	MATH	2421	Probability	4
	MATH	2431	Honors Probability	4
	MATH	3322	Matrix Computation	3
	MATH	3332	Data Analytic Tools	3
	MATH	3425	Stochastic Modeling	3
	MATH	4023	Complex Analysis	3
	MATH	4051	Theory of Ordinary Differential Equations	3
	MATH	4321	Game Theory	3
	MATH	4326	Introduction to Fluid Dynamics	3

MATH	4333	Mathematical Biology	3
MATH	4335	Introduction to Optimization	3
MATH	4336	Introduction to Mathematics of Image Processing	3
MATH	4343	Introduction to Graph Theory	4
MATH	4351	Numerical Solutions of Partial Differential Equations	3
MATH	4511	Quantitative Methods for Fixed Income Derivatives	3
MATH	4512	Fundamentals of Mathematical Finance	3
MATH	4823	Special Topics in Applied Mathematics	1-4

Computer Science Track

Required Course(s)

			Credit(s) attained
MATH/COMP		Note: MATH 2343 OR COMP 2711 OR COMP 2711H	4
MATH	2343	Discrete Structures	4
COMP	2711	Discrete Mathematical Tools for Computer Science	4
COMP	2711H	Honors Discrete Mathematical Tools for Computer Science	4
MATH	3121	Abstract Algebra	3
MATH		Note: MATH 4991 OR MATH 4992 OR MATH 4999	3
MATH	4991	Capstone Project in Pure Mathematics	3
MATH	4992	Capstone Project in Applied Mathematics	3
MATH	4999	Independent Capstone Project	3
COMP		Note: (COMP 2011 AND COMP 2012) OR COMP 2012H	5-8
COMP	2011	Programming with C++	4
COMP	2012	Object-Oriented Programming and Data Structures	4
COMP	2012H	Honors Object-Oriented Programming and Data Structures	5
COMP	2611	Computer Organization	4
COMP		Note: COMP 3711 OR COMP 3711H	3-4
COMP	3711	Design and Analysis of Algorithms	3
COMP	3711H	Honors Design and Analysis of Algorithms	4

Elective Course(s)

			Minimum credit(s) required
MATH		MATH 3000-level or above Elective (Any 1 course of the subject and level as specified)	3
MATH		MATH Electives (2 courses from the specified elective list)	6
MATH	2001	Foundation of Mathematics	2
MATH	2411	Applied Statistics	4
MATH	2421	Probability	4
MATH	2431	Honors Probability	4
MATH	3312	Numerical Analysis	3

MATH	3322		Matrix Computation	3
MATH	3332		Data Analytic Tools	3
MATH	3343		Combinatorial Analysis	3
MATH	4023		Complex Analysis	3
MATH	4141		Number Theory and Applications	3
MATH	4223		Differential Geometry	3
MATH	4321		Game Theory	3
MATH	4343		Introduction to Graph Theory	4
COMP			COMP 4000-level or above Elective (Any 1 course of the subject and level as specified)	3
COMP			(For students opting COMP 2012H only) COMP 2000-level or above Elective (Any 1 course of the subject and level as specified. Students opting COMP 2011 AND COMP 2012 do not need to fulfill this requirement.)	0-3
COMP			COMP Elective (1 course from the specified elective list)	3
	COMP	3031	Principles of Programming Languages	3
	COMP	3111	Software Engineering	4
	COMP	3111H	Honors Software Engineering	4
	COMP	3211	Fundamentals of Artificial Intelligence	3
	COMP	3311	Database Management Systems	3
	COMP	3511	Operating Systems	3

Financial and Actuarial Mathematics Track

Required Course(s)

				Credit(s) attained
MATH	2411		Applied Statistics	4
MATH			Note: MATH 2421 OR MATH 2431	4
	MATH	2421	Probability	4
	MATH	2431	Honors Probability	4
MATH	2511		Fundamentals of Actuarial Mathematics	3
MATH	3423		Statistical Inference	3
MATH	4427		Loss Models and their Applications	3
MATH	4511		Quantitative Methods for Fixed Income Derivatives	3
MATH	4512		Fundamentals of Mathematical Finance	3
MATH	4513		Life Contingencies Models and Insurance Risk	3
MATH	4514		Financial Economics in Actuarial Science	3
MATH	4515**		Statistical and Computational Methods in Financial Mathematics	3
MATH			Note: MATH 4996 OR MATH 4999	3
	MATH	4996**	Capstone Project in Financial and Actuarial Mathematics	3
	MATH	4999	Independent Capstone Project	3

Elective Course(s)

			Minimum credit(s) required
MATH		Pure or Applied Mathematics Elective (1 course from the specified elective list)	2
MATH	2001	Foundation of Mathematics	2
MATH	2352	Differential Equations	4
MATH	3312	Numerical Analysis	3
MATH	3343	Combinatorial Analysis	3
MATH	4023	Complex Analysis	3
MATH	4052	Partial Differential Equations	3
MATH		MATH Depth Electives (2 courses from the specified elective list. Courses taken as Required Courses may not be reused to count towards this elective requirement.)	6
MATH	3424	Regression Analysis	3
MATH	3425	Stochastic Modeling	3
MATH	3426	Sampling	3
MATH	3427	Bayesian Statistics	3
MATH	3428**	Statistical Computing	3
MATH	4423	Nonparametric Statistics	3
MATH	4424	Multivariate Analysis	3
MATH	4425	Introductory Time Series	3
MATH	4426	Survival Analysis	3
MATH	4429**	Credibility Theory and its Applications	3
MATH	4432	Statistical Machine Learning	3
MATH	4433**	Spatial Data Analysis	3

General Mathematics Track

Required Course(s)

			Credit(s) attained
MATH		Note: MATH 4991 OR MATH 4992 OR MATH 4993 OR MATH 4999	3
MATH	4991	Capstone Project in Pure Mathematics	3
MATH	4992	Capstone Project in Applied Mathematics	3
MATH	4993	Capstone Project in Statistics	3
MATH	4999	Independent Capstone Project	3

Elective Course(s)

		Minimum credit(s) required
MATH	MATH 2000-level or above Electives (Any 3 courses of the subject and level as specified)	9
MATH	MATH 3000-level or above Electives (Any 2 courses of the subject and level as specified)	6

MATH		MATH 4000-level or above Electives (Any 2 courses of the subject and level as specified)	6

International Research Enrichment Track

Students in the IRE Track should also take MATH 1023, MATH 1024, MATH 2001, MATH 2043, MATH 2131 and MATH 3043 as specified in the major requirements.

Required Course(s)

			Credit(s) attained
SCIE	3500	IRE Research Project I	3
SCIE	4500	IRE Research Project II	3

Other(s)

		With approval by the program office, students should follow the curriculum of one of the following Mathematics Tracks: Pure Mathematics (Advanced) Track, Applied Mathematics Track, Statistics Track and complete all of its requirements excluding the capstone project requirement, which should be fulfilled by both SCIE 3500 and SCIE 4500 only. For students approved to follow the Applied Mathematics Track and Statistics Track, they must choose MATH 2431 which is listed in the Track Requirements; while for those who follow the Pure Mathematics (Advanced) Track, they should take MATH 2431 as an additional required course.	26-28

Pure Mathematics (Advanced) Track

Students in the Pure Mathematics (Advanced) Track should also take MATH 2043, MATH 2131, and MATH 3043 as specified in the major requirements.

Required Course(s)

			Credit(s) attained
MATH	2001	Foundation of Mathematics	2
MATH	3131	Honors in Linear and Abstract Algebra II	4
MATH	4225	Topology	3
MATH		Note: MATH 4991 <u>OR</u> MATH 4999	3
MATH	4991	Capstone Project in Pure Mathematics	3
MATH	4999	Independent Capstone Project	3

Elective Course(s)

			Minimum credit(s) required
MATH		MATH Depth Electives (4 courses from the specified elective list, of which at least 1 course from each area in Algebra / Analysis / Geometry)	12

Algebra

MATH	4141	Number Theory and Applications	3
MATH	4151	Introduction to Lie Groups	3

Analysis

MATH	4023	Complex Analysis	3
MATH	4051	Theory of Ordinary Differential Equations	3
MATH	4052	Partial Differential Equations	3
MATH	4063	Functional Analysis	3

Geometry

MATH	4033	Calculus on Manifolds	3
MATH	4221	Euclidean and Non-Euclidean Geometries	3
MATH	4223	Differential Geometry	3
MATH		MATH 3000-level or above Elective (Any 1 course of the subject and level as specified)	3
MATH		Applied Mathematics or Statistics Elective (1 course from the specified elective list)	3
MATH	2343	Discrete Structures	4
MATH	2352	Differential Equations	4
MATH	2411	Applied Statistics	4
MATH	3312	Numerical Analysis	3
MATH	3343	Combinatorial Analysis	3
MATH	4321	Game Theory	3
MATH	4326	Introduction to Fluid Dynamics	3
MATH	4343	Introduction to Graph Theory	4

Pure Mathematics Track

Required Course(s)

			Credit(s) attained
MATH	2001	Foundation of Mathematics	2
MATH	3121	Abstract Algebra	3
MATH	4225	Topology	3
MATH		Note: MATH 4991 OR MATH 4999	3
MATH	4991	Capstone Project in Pure Mathematics	3
MATH	4999	Independent Capstone Project	3

Elective Course(s)

			Minimum credit(s) required
MATH		MATH 2000-level or above Electives (Any 2 courses of the subject and level as specified)	6
MATH		Applied Mathematics or Statistics Elective (1 course from the specified elective list)	3
MATH	2343	Discrete Structures	4
MATH	2352	Differential Equations	4

MATH	2411	Applied Statistics		4
MATH	3312	Numerical Analysis		3
MATH	3343	Combinatorial Analysis		3
MATH	4321	Game Theory		3
MATH	4326	Introduction to Fluid Dynamics		3
MATH	4343	Introduction to Graph Theory		4
MATH		Analysis Depth Elective (1 course from the specified elective list)		3
MATH	4023	Complex Analysis		3
MATH	4051	Theory of Ordinary Differential Equations		3
MATH	4052	Partial Differential Equations		3
MATH	4063	Functional Analysis		3
MATH		Geometry Depth Elective (1 course from the specified elective list)		3
MATH	4033	Calculus on Manifolds		3
MATH	4221	Euclidean and Non-Euclidean Geometries		3
MATH	4223	Differential Geometry		3
MATH		Algebra Depth Elective (1 course from the specified elective list)		3
MATH	4141	Number Theory and Applications		3
MATH	4151	Introduction to Lie Groups		3

Statistics Track

Required Course(s)

			Credit(s) attained
MATH	2411	Applied Statistics	4
MATH		Note: MATH 2421 OR MATH 2431	4
MATH	2421	Probability	4
MATH	2431	Honors Probability	4
MATH	3423	Statistical Inference	3
MATH	3424	Regression Analysis	3
MATH	3426	Sampling	3
MATH	3427	Bayesian Statistics	3
MATH	3428**	Statistical Computing	3
MATH		Note: MATH 4424 OR MATH 4425	3
MATH	4424	Multivariate Analysis	3
MATH	4425	Introductory Time Series	3
MATH		Note: MATH 4993 OR MATH 4999	3
MATH	4993	Capstone Project in Statistics	3
MATH	4999	Independent Capstone Project	3

Elective Course(s)

				Minimum credit(s) required
MATH			Pure or Applied Mathematics Elective (1 course from the specified elective list)	2
	MATH	2001	Foundation of Mathematics	2
	MATH	2352	Differential Equations	4
	MATH	3312	Numerical Analysis	3
	MATH	3343	Combinatorial Analysis	3
	MATH	4023	Complex Analysis	3
	MATH	4052	Partial Differential Equations	3
MATH			MATH Depth Electives (2 courses from the specified elective list. Courses taken as Required Courses may not be reused to count towards this elective requirement.)	6
	MATH	3425	Stochastic Modeling	3
	MATH	4423	Nonparametric Statistics	3
	MATH	4424	Multivariate Analysis	3
	MATH	4425	Introductory Time Series	3
	MATH	4426	Survival Analysis	3
	MATH	4432	Statistical Machine Learning	3
	MATH	4433**	Spatial Data Analysis	3
	MATH	4434**	Deep Learning	3
	MATH	4511	Quantitative Methods for Fixed Income Derivatives	3
	MATH	4512	Fundamentals of Mathematical Finance	3

**Remarks on course(s):		
-	MATH 3428:	This is a new course to take effect in Fall, 2024-25.
-	MATH 4429:	This is a new course to take effect in Fall, 2024-25.
-	MATH 4433:	This is a new course to take effect in Fall, 2024-25.
-	MATH 4434:	This is a new course to take effect in Fall, 2024-25.
-	MATH 4515:	This is a new course to take effect in Fall, 2024-25.
-	MATH 4996:	This is a new course to take effect in Spring, 2024-25.