

# **Department of Mathematics**

## **Program of Mathematics and Applied Mathematics**

### **for International Students (2023)**

#### **I. Introduction**

Established in 2012, Southern University of Science and Technology is a young university aiming to become a top research university in the world. In recent years, the university has attracted many outstanding researchers. The Department of Mathematics currently has 44 full-time faculty members. Our faculty members' research covers a broad range of areas including Mathematics (dynamical systems, algebra and combinatorics, algebraic number theory, PDEs, mathematical physics and differential geometry, etc.), Computational and Applied Mathematics (applied mathematics, numerical analysis, computational fluid dynamics, scientific computing, inverse problems, data science, etc.), Probability and Statistics, and Financial Mathematics.

There are many jobs and opportunities for further academic development for undergraduate students in mathematics and applied mathematics. Government agencies, banks, insurance companies, securities investment companies, software developers, market survey and analysis companies, e-commerce companies and many high-tech companies all have job opportunities for undergraduate students in mathematics and applied mathematics. Students who wish to pursue graduate studies in mathematics and applied mathematics can also find many opportunities either in China or overseas.

Academic subject areas: Mathematics

Program code: 070101

#### **II. Objectives and Learning Outcomes**

##### **1. Objectives**

The objective of the undergraduate programs in mathematics and applied mathematics is to produce outstanding students with a solid foundation in mathematics, a broad knowledge base in

related areas such scientific computing and other areas of science, and excellent ability of critical thinking and working independently.

## 2. Learning Outcomes

The department provides a wide variety of courses that will meet the needs of students interested in pure mathematics and applied mathematics. The ultimate training objective of the undergraduate programs is to enable students to excel in their future career choices, whether they choose to work in government or industries, or to become mathematical scientists.

### III. Study Length, Degree, and Graduation Requirements

1. Study length: 4 years.

2. Degree conferred: Students who complete and meet the degree requirements of the undergraduate program will be awarded a bachelor's degree in Science

3. The minimum credit requirement for graduation: 145 credits. The specific requirements are as follows.

	<b>Module</b>	<b>Category</b>	<b>Minimum Credit Requirement</b>
General Education Courses	Chinese Language and Culture Module	Chinese Language and Culture	16
	Arts and Physical Education Module	Physical Education	4
		Arts	2
	Competence Development Module	Computer Programming	3
		Writing	2
		Foreign Languages	14
	Humanities and Social Sciences Module	Humanities	6
		Social Sciences	
		Chinese Studies	2
	Mathematics and Natural Sciences Module	Mathematics	12
		Physics	10
		Chemistry	3
		Geoscience + Life Science	3
GE to Majors Bridging Module	Introduction to Majors	2	
Major Courses	Major Required Courses	Major Foundational Courses	13
		Major Core Courses	13

		Practice-based Learning (Undergraduate Thesis, Internships, Research projects, etc.)	14
	Major Elective Courses	Major Elective Courses	26
Total			145
Note: please see the General Education Requirement for more details on Chinese Language and Culture Module, Arts and Physical Education Module, Competence Development Module (Foreign Languages & Writing) , Humanities and Social Sciences Module, and GE to Majors Bridging Module.			

#### IV. Course Requirements for the Mathematics and Natural Sciences Module and Computer Programming

Course Category	Course Code	Course Name	Credits	Terms	Prerequisite	Dept.
Mathematics	MA117	Calculus I	4	Spr/ Fall	None	Department of Mathematics
	MA127	Calculus II	4	Spr/ Fall	MA117	Department of Mathematics
	MA113	Linear Algebra	4	Spr/ Fall	None	Department of Mathematics
Physics	PHY101/ PHY105	General Physics I / College Physics I	4	Spr/ Fall	None	Department of Physics
	PHY102/ PHY106	General Physics II/ College Physics II	4	Spr/ Fall	College Physics I	Department of Physics
	PHY104B	Experiments of Fundamental Physics	2	1-2 Spring & Fall	None	Department of Physics
Chemistry	CH103/ CH105	General Chemistry/ Chemistry: The Central Science	3	1-2 Spring & Fall	None	Department of Chemistry
Geoscience + Life Science	BIO103/ BIO102B/ EOE100	Principles of Biology/ Introduction to Life Science/ Introduction to Earth Sciences	3	1-2 Spring & Fall	None	Department of Biology/ Department of ESS, OCE and ESE
Computer Programming	CS109/ CS110/ CS111/ CS112/ CS113	Introduction to Computer Programming/ Introduction to Java Programming/ Introduction to C programming/ Introduction to Python Programming Python / Introduction to Matlab Programming	3	1-2 Spring & Fall	None	Dept. of Computer Science and Engineering

## V. Prerequisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of the first academic year	Declare major at the end of the first academic year	MA117	Calculus I
		MA127	Calculus II
		MA113	Linear Algebra
		MA109	Advanced Linear Algebra
Declare major at the end of the second academic year	Declare major at the end of the second academic year	MA117	Calculus I
		MA127	Calculus II
		MA113	Linear Algebra
		MA109	Advanced Linear Algebra
		CS109/CS110/CS111/CS112/CS113	Introduction to Computer Programming/ Introduction to Java Programming/ Introduction to C programming/ Introduction to Python Programming Python / Introduction to Matlab Programming
<p>Note:</p> <ol style="list-style-type: none"> <li>1. If the number of students entering a major at the end of the first academic year in the department is greater than or equal to the total number of the teaching-research faculty (PI)*2*60%, all majors in the department may implement the prerequisites for major declaration at the end of the second academic year.</li> <li>2. If the number of students entering a major at the end of the first academic year in the department is less than the total number of the teaching-research faculty (PI)*2*60%, all majors in the department do not implement the prerequisites for major declaration at the end of the second academic year.</li> <li>3. Suppose the number of students applying for a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), then the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance).</li> <li>4. For departments that do not implement prerequisites for major declaration at end of the second academic year, if the cumulative number of students applying for a major at the end of the second academic year and the number of students who have entered a major at the end of the first academic year exceeds four times the total number of the teaching-research faculty (PI), the department may select students according to predetermined rules. In principle, the rules set by the department shall examine the students' suitability for the major and not based on weighted GPA (Specific rules shall be set by the department and announced in advance).</li> </ol>			

## VI: Major Course Arrangement

**Table 1: Major Required Courses**

### Program of Mathematics and Applied Mathematics

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	MA109	Advanced Linear Algebra	4	0	1/Spring	MA113	Department of Mathematics
	MA213-16	Mathematical Analysis	5	0	2/Fall	MA127	Department of Mathematics
	MA215	Probability Theory	4	0	2/Fall	MA102a/ MA127/ MA128	Department of Mathematics
	<b>Total</b>			13	0		
Major Core Courses	MA202	Complex Analysis	3	0	2/Spr	MA213-16	Department of Mathematics
	MA201a	Ordinary Differential Equations A	4	0	2/Spr	MA213-16 & MA109	Department of Mathematics
	MA301	Real Analysis	3	0	3/Fall	MA213-16	Department of Mathematics
	MA303	Partial Differential Equations	3	0	3/Fall	MA201a	Department of Mathematics
	<b>Total</b>			13	0		
Practice-based Courses	MA491	Undergraduate Thesis/Project	12	12	4/Spr	NONE	Department of Mathematics
	MA480	Research Projects*	2	2	Any semester after the first school year	NONE	Department of Mathematics
	MA470	Internship*		2	Any summer after the first school year	NONE	Department of Mathematics
	<b>Total</b>			14	16		
<b>Total</b>			40	16			

Note: Students are required to choose Research Projects (including all kinds of scientific research activities, scientific and technological innovation projects, winning prizes in competitions above the provincial level, publishing papers, engaging in advanced studies both at home and abroad as well as attending a certain number of seminars or public lectures, and related credits are identified by the Department) and one course in Internship to carry out practice.

**Table 2: Major Elective Courses**

**Program of Mathematics and Applied Mathematics**

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
MA209-16	Elementary Number Theory	3	0	2/Fall	MA109	Department of Mathematics
MA206	Mathematical Modeling	3	1	2/Spr	MA201a	Department of Mathematics
MA214	Abstract Algebra	3	0	2/Spr	MA109	Department of Mathematics
MA208	Applied Stochastic Processes	3	0	2/Spr	MA213-16 & (MA215/MA212) & MA109	Department of Mathematics
MA210	Operations Research	3	0	2/Spr	MA231/MA213-16	Department of Mathematics
MA204	Mathematical Statistics	3	0	2/Spr	MA215/MA212	Department of SDC
MA207	Mathematical Experiments	3	1	3/Fall	MA213-16	Department of Mathematics
MA216	Computational Finance	3	0	3/Fall	(MA215/MA212) & MA109	Department of Mathematics
MA323	Topology	3	0	3/Fall	MA214	Department of Mathematics
MA321	Representations of groups	3	0	3/Fall	MA214	Department of Mathematics
MA234	Introduction to Theoretical and Practical Data Science	4	1	3/Spr	MA212	Department of Mathematics
MA302	Functional Analysis	3	0	3/Spr	MA301&MA202&MA109	Department of Mathematics
MA327	Differential Geometry	3	0	3/Spr	MA201a	Department of Mathematics
MA401	Dynamical Systems	3	0	4/Fall	MA201a	Department of Mathematics
MAT8005	Differentiable Manifolds	3	0	4/Fall	MA327	Department of Mathematics
MAT8022	Combinatorics	3	0	4/Fall	MA214	Department of Mathematics
MAT8020	Abstract Algebra II	3	0	4/Fall	MA214	Department of Mathematics
MAT7074	Commutative Algebra	3	0	4/Spr	MA214	Department of Mathematics
MAT7087	Computational Fluid Dynamics and Deep Learning	3	0	4/Spr	MA305	Department of Mathematics
MAT7093	Stochastic Analysis	3	0	4/Spr	MA208&MA302	Department of Mathematics
MAT8021	Algebraic Topology	3	0	4/Spr	MA323	Department of Mathematics
MAT8026	Advanced Functional Analysis	3	0	4/Spr	MA302	Department of Mathematics
<b>Total</b>		67	3			

Notes:  
 1. Students are required to complete 26 credits for the Major Elective Courses.

**Table 3: Overview of Practice-based Learning**

**Program of Mathematics and Applied Mathematics**

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
PHY104B	Experiments of Fundamental Physics	2	2	1-2 Spring & Fall	None	Department of Physics
CS109	Introduction to Computer Programming	3	1	1-2 Spring & Fall	None	Department of Physics
CS110	Introduction to Java Programming	3	1	1-2 Spring & Fall	None	Department of Physics
CS111	Introduction to C programming	3	1	1-2 Spring & Fall	None	Department of Physics
CS112	Introduction to Python Programming Python	3	1	1-2 Spring & Fall	None	Department of Physics
CS113	Introduction to Matlab Programming	3	1	1-2 Spring & Fall	None	Department of Physics
MA206	Mathematical Modeling	3	1	2/Spr	MA201a	Department of Mathematics
MA207	Mathematical Experiments	3	1	3/Fall	MA213-16	Department of Mathematics
MA234	Introduction to Theoretical and Practical Data Science	4	1	3/Spr	MA212	Department of Mathematics
MA470	Internship	2	2			Department of Mathematics
MA491	Undergraduate Thesis/Project	12	12			Department of Mathematics
Total		41	24			

## Curriculum Structure of Mathematics and Applied Mathematics

### Mathematics and Applied Mathematics

