

Department of Mathematics

Financial Mathematics

I. Introduction

Established in 2012, Southern University of Science and Technology is intended to become a top-tier international university and has attracted many outstanding researchers in recent years. The Department of Mathematics currently has 30 full-time faculty members, including 5 chair professors, 6 professors, 1 associate professor, 5 assistant professors and 4 visiting assistant professors. Three of the professors are members of the “Recruitment Program of Global Experts”, 2 are “Chang Jiang Scholars”, 2 are winners of the National Science Foundation Award for Distinguished Young Scholars, and 1 has received the “Young Overseas High-level Talents” award. In addition to the 21 research professors, there are 9 teaching professors dedicated to high quality teaching, and the department is expected to grow quickly in coming years.

Faculty members engage in various aspects of mathematics including basic mathematics, applied mathematics, financial mathematics, computational mathematics and statistics. They have a broad vision, profound knowledge, a strong sense of responsibility and experience in teaching and scientific research in well-known universities and research institutions both in China and abroad. They teach the basic theories and methods of mathematical sciences, with a focus on developing students’ ability to design mathematical models and solve practical problems with computers.

In 2012 the Chinese Ministry of Education approved financial mathematics as a major in the field of economics. At present, more than 60 universities have been granted

the right confer degrees in financial mathematics. Students enroll in schools or departments of mathematics and can obtain a Bachelor's degree in Economics.

In China, option trading began in 2015. With the rapid development of networks, the scale of high-frequency trading via networks will also increase. In order to prevent financial crisis and to maintain the stability of financial markets, talents of financial risk management are in urgent need. As a result, there is a shortage of talents with excellent foundation of mathematics, superb computer programming skills and a good understanding of finance. It is of great significance to develop the financial mathematics major well in order to cultivate high-end financial talents for China's financial industry.

II. Objectives

The Financial Mathematics program aims to cultivate interdisciplinary financial talents who possess good professional ethics, solid theoretical basis of financial mathematics, superior abilities in data processing and computer programming, high level of foreign languages as well as innovative and entrepreneurial spirit, and are able to engage in financial data processing, model analysis, quantitative investment and risk management in all kinds of financial institutions, and to lay a theoretical foundation for them to pursue postgraduate studies.

III. Period of Study and Degree Requirement

Time length: 4 years.

Degree conferred: Bachelor of Economics.

The minimum credit requirement for graduation: 146.5 credits

IV. Discipline

Economics

V. Main Courses

Foundational core courses: Mathematical Analysis I&II&III, Linear Algebra I&II, Ordinary Differential Equations A, Theory of Functions of a Real Variable, Probability Theory, Mathematical Statistics, Applied Stochastic Processes, Macroeconomics, Microeconomics, Econometrics, Security Investments, Financial Economics, Models and Pricing of Financial Derivatives, Asset Pricing and Risk Management, and etc.

VI. Practice-Based Courses

Undergraduate Thesis/Project, Research Projects and Internship, etc.

VII. Course Structure and Credit Requirements

Scheme 1: Taking courses in Mathematical Analysis series

General Education (GE) Required Courses: 58.5 credits;

General Education (GE) Elective Courses: 10 credits;

Major Foundational Courses: 14 credits;

Major Core Courses: 45 credits;

Major Elective Courses: 9 credits;

Undergraduate Thesis/Projects, Research Projects and Internship: 10 credits;

The minimum credit requirement for graduation: 146.5 credits.

Scheme 2: Taking courses in Calculus series

General Education (GE) Required Courses: 66.5 credits

General Education (GE) Elective Courses: 10 credits

Major Foundational Courses: 4 credits

Major Core Courses: 45 credits

Major Elective Courses: 11 credits

Undergraduate Thesis/Projects, Research Projects and Internship: 10 credits

The minimum credit requirement for graduation: 146.5 credits.

VIII. Course Arrangement

Table 1: Major Required Courses (Foundational and Core Courses)

Course Category	Course Code	Course Name	Credits	Lab Credits	Hours/week	Terms	Advised term to take the	Instruction language	Prerequisite	Dept.
Major Foundational Courses	MA101a /MA101b	Mathematical Analysis I / Calculus I	5/4		4	Fall/ Fall & Spr.	1/Fall	C&E/ C or E or C&E	NA	MATH
	MA103b	Linear Algebra I	4		4	Spr.	1/Spr.	C or E or C&E	NA	MATH
	MA102a /MA102b	Mathematical Analysis II/ Calculus II	5/4		4	Spr. / Fall & Spr.	1/Spr.	C&E/ C or E or C&E	Mathematical Analysis I /Calculus I	MATH
	MA104b	Linear Algebra II	4		4	Fall	1/Fall	C or E or C&E	Linea Algebra I	MATH
	Total		18/16		16					
Major Core Courses	MA215	Probability Theory	4		3	Fall	2/Fall	E	Calculus I&II (or Mathematical Analysis I&II), Linear Algebra I&II	MATH
	FIN201	Microeconomics	3		3	Fall	1/Fall	C&E	NA	FIN
	MA203a /MA213	Mathematical Analysis III/ Real Analysis	5		4	Fall	2/Fall	C&E	Mathematical Analysis I&II/ Calculus I&II	MATH
	MA201a	Ordinary Differential Equations A	4		3	Spr.	2/Spr.	C or E or C&E	Mathematical Analysis I& II & III (or Calculus I&II and Real Analysis), Linear Algebra I&II	MATH
	MA204	Mathematical Statistics	4		3	Spr.	2/Spr.	C or E or C&E	Mathematical Analysis I&II (or Calculus I&II), Linear Algebra I&II, Probability Theory (or Probability and Statistics)	MATH
	MA301	Theory of Functions of a Real Variable	3		3	Fall	3/Fall	C or E	Mathematical Analysis I&II&III (Calculus I&II and Real Analysis)	MATH
	FIN204	Macroeconomics	3		3	Spr.	1/Spr.	C&E	NA	FIN
	MA208	Applied Stochastic Processes	4		3	Spr.	2/Spr.	E	Mathematical Analysis I&II&III (Calculus I&II and Real Analysis), Linear Algebra I&II, Probability Theory(or Probability and Statistics)	MATH
	FMA303	Security Investments	3		3	Fall	3/Fall	C or E	Mathematical Analysis I & II & III (or Calculus I & II and Real Analysis), Linear Algebra I&II, Probability Theory (or Probability and Statistics)	MATH

	FMA301	Econometrics	3		3	Fall	3/Fall	C	Mathematical Analysis I&II& III (Calculus I&II), Linear Algebra I&II, Mathematical Statistics (or Probability and Statistics), Microeconomics, Macroeconomics	MATH
	FMA307	Models and Pricing of Financial Derivatives	3		3	Spr.	3/Spr.	C&E	Mathematical Analysis I&II&III(Calculus I&II and Real Analysis), Probability Theory(or Probability and Statistics), Partial Differential Equations and Applied Stochastic Processes will be helpful	MATH
	FMA302	Financial Economics	3		3	Spr.	3/Spr.	C&E	Mathematical Analysis I&II&III (or Calculus I&II and Real Analysis), Probability Theory (or Probability and Statistics), Security Investment will be helpful	MATH
	FMA304	Asset Pricing and Risk Management	3		3	Spr.	3/Spr.	C	Mathematical Analysis I&II& III (Calculus I&II), Linear Algebra I&II, Mathematical Statistics (or Probability and Statistics), Microeconomics, Macroeconomics, Time Series Analysis, Econometrics	MATH
	Total		45		40					
MA490	Undergraduate Thesis/Project		8	8	16	Fall & Spr.	4/Spr. &Fall	C&E		MATH
MA480	Research Projects*		2	2	4	Fall or Spr. or Smr.	Any term after the first school year	C&E		MATH
MA470	Internship*				16	Smr.	Any summer after the first school year	C&E		MATH
Total			73 / 71	10	92					

Note: Students can choose series of mathematical analysis I, II & III (students who will engage in academic research are advised to choose this series) or series of Calculus I & II and mathematical analysis. Minimum credits of Major Foundational Courses are 14/4, and minimum required credits of Major Required Courses are 59/49 (credits of Calculus I & II and Linear Algebra I are included in GE Required Courses), but total required credits of such two series are the same.

*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. Students can also

choose to carry out Research Projects and Internship in any semester after the first school year, and the minimum required period for Internship is 4 weeks.

Table 2: Major Elective Courses

Course Code	Course Name	Credits	Lab Credits	Hours /week	Terms	Advised term to take the	Instruction language	Prerequisite	Dept.
MA106	C/C++ Programming language	3	1	4	Spr.	1/Spr.	C	Programming and Database will be helpful but not necessary	MATH
MA108	Programming and Database	3	1	4	Spr.	1/Spr.	C	NA	MATH
MA110	MATLAB Programming and Application	3		3	Fall	2/Fall	C or E or C&E	Linear Algebra I&II	MATH
MA216	Computational Finance	3		3	Fall	2/Fall	C&E	Calculus I&II (or Mathematical Analysis I&II), Linear Algebra I&II, Probability Theory (or Probability and Statistics)	MATH
MA211	Data structure and algorithms	3	1	4	Fall	2/Fall	C	Programming and Database or C/C++ Programming language	MATH
FIN203	Financial Accounting	3		3	Spr.	2/Fall	C&E	NA	FIN
FIN207	Financial Market, Institutions and Regulations	3		3	Spr.	2/Fall	C&E	NA	FIN
FIN209	Entrepreneurial Finance and Innovation I	3		3	Spr.	2/Fall	C&E	NA	FIN
MA207	Mathematical Experiments	3	1	4	Fall	2/Fall	C&E	Mathematics Analysis I&II (or Calculus I&II); Linear Algebra I	MATH
GE106	Computer System Design and Application	3	1	4	Spr.	2/Spr.			Comp. Sci.& Eng.
MA214	Abstract Algebra	3		3	Spr.	2/Spr.	C or E or C&E	Linea Algebra I&II	MATH
MA205	Discrete Mathematics	3		3	Spr.	2/Spr.	C	Calculus I&II (Mathematical Analysis I&II&III), Linear Algebra I	MATH
MA206	Mathematical Modelling	3		3	Spr.	2/Spr.	C&E	Mathematics Analysis I&II (or Calculus I&II), Linear Algebra I	MATH
MA210	Operations Research	3			Spr.	2/Spr.	C	Mathematical Analysis I&II (Calculus I&II)	MATH
MA202	Complex Analysis	3		3	Spr.	2/Spr.	C&E	Mathematical Analysis I & II & III (or Calculus I & II and Real Analysis), Linear Algebra I	MATH
FIN206	Corporate Finance	3		3	Spr.	2/Spr.	C&E	Financial Accounting, Microeconomics	FIN
FIN208	Financial data analysis and Data Mining	3	1	4	Spr.	2/Spr.	C&E	NA	FIN

MA331	Parallel Computing	3	1	4	Fall	3/Fall	C	Data structure and algorithms	MATH
MA303	Partial Differential Equation	3		3	Fall	3/Fall	C or E or C&E	Calculus I&II (Mathematical Analysis I&II&III), Linear Algebra I, Ordinary Differential Equations A or B	MATH
FMA322	Life Insurance Actuarial Science	3		3	Fall	4/Fall	C or E	Calculus I&II (or Mathematical Analysis I&II&III), Linear Algebra I, Probability and Statistics (or Probability Theory)	MATH
GGC5001	Mathematics Writing in English (PG)	3		3	Fall	3/Fall	C&E	English for Academic Purposes I&II&III&IV, Calculus I&II (or Mathematical Analysis I&II&III), and Linear Algebra I&II	MATH
FMA317	Applied Financial Statistics	3		3	Fall	4/Fall	C	Mathematical Analysis I&II&III (Calculus I&II), Linear Algebra I&II, Mathematical Statistics (or Probability and Statistics), Time Series Analysis, Econometrics	MATH
FMA309	Time Series Analysis	3		3	Fall	3/Fall	C	Mathematical Analysis I&II&III (Calculus I&II), Linear Algebra I&II, Mathematical Statistics (or Probability and Statistics)	MATH
MA313	Stochastic Analysis	3		3	Spr.	3/Spr.	C or E	Mathematical Analysis I&II (or Calculus I&II), Theory of Functions of a Real Variable	MATH
FIN301	Financial Investments	3		3	Fall	3/Fall	C&E	Microeconomics, Macroeconomics, Probability and Statistics	FIN
FIN307	Database Management Systems and Financial Applications	3	1	4	Fall	3/Fall	C&E	Computer System Design and Application	FIN
FIN309	Artificial Intelligence and Financial Applications	3	1	4	Fall	3/Fall	C&E	Basis of computer programming, Data structure and algorithms	FIN
FIN411	International Finance	2		2	Fall	3/Fall	C&E	Corporate Finance, Financial Investments	FIN
MA220	Topics on Computational Mathematics	3		3	Smr.	2/Smr.	C or E or C&E	prerequisites determined by the instructor	MATH
MA304	Multivariate Statistical Analysis	3		3	Spr.	3/Spr.	C	Mathematical Analysis I&II&III (Calculus I&II), Linear Algebra I&II, Mathematical Statistics (or Probability and Statistics)	MATH
MA302	Functional Analysis	3		3	Spr.	3/Spr.	C&E	Mathematical Analysis I&II&III (Calculus I&II and Real Analysis), Linear Algebra I&II	MATH
MA308	Statistical Computation and Software	3.5	0.5	4	Spr.	3/Spr.	C or E or C&E	Probability and Statistics (or Probability Theory & Mathematical Statistics), Statistical Linear Models	MATH
MA329	Statistical Linear Models	3			Spr.	3/Spr.	E	Mathematical Statistics (or Probability and Statistics)	MATH
FIN302	Empirical Methods in Finance	3	1	4	Spr.	3/Spr.	C&E	Econometrics; Options, Futures and Financial Derivatives	FIN
FIN306	Fixed Income: Models and	2		2	Spr.	3/Spr.	C&E	Options, Futures and Financial Derivatives	FIN

	Applications								
FIN407	Investment Banking	3		3	Spr.	3/Spr.	C&E	Corporate Finance	FIN
FINS301	Behavioral Finance	1		1	Smr.	3/Smr.	C&E	Corporate Finance	FIN
MAT7002	Measure Theory and Integration (PG)	3		3	Fall	4/Fall	C or E or C&E	Theory of Functions of a Real Variable (Complex Analysis and Functional Analysis will be helpful but not necessary)	MATH
MAT7003	Functional Analysis (PG)	3		3	Fall	4/Fall	C or E or C&E	Linear Algebra I&II, Complex Analysis, Theory of Functions of a Real Variable, Functional Analysis	MATH
MA417	Nonparametric Statistics	3		3	Fall	4/Fall	E	Mathematical Statistics (or Probability and Statistics)	MATH
FMA407	Topics on Financial Mathematics	3		3	Fall	4/Fall	C or E or C&E	prerequisites determined by the instructor	MATH
FMA415	Topics on Financial Mathematics: Dynamics of Finance	3		3	Fall	4/Fall	C&E	Mathematical Analysis I&II&III (or Calculus I&II and Real Analysis), Linear Algebra I&II, Ordinary Differential Equations A or B, Security Investment	MATH
MA405	Survival Analysis	3		3	Fall	4/Fall	E	Mathematical Statistics (or Probability and Statistics), and Statistical Linear Models	MATH
MA402	Computational Statistics with R	3		3	Fall	4/Fall	C or E or C&E	Probability and Statistics (or Probability Theory & Mathematical Statistics); Statistical Linear Models	MATH
MA409	Statistical Data Analysis with SAS	3.5	0.5	4	Spr.	4/Fall	C or E or C&E	Probability and Statistics (or Probability Theory & Mathematical Statistics), Statistical Linear Models	MATH
FIN403	Cases in Financial Innovations	3	1	4	Fall	4/Fall	C&E	Options, Futures and Financial Derivatives	FIN
FIN405	China Economics and Finance	2	1	3	Fall	4/Fall	C&E	Financial Economics	FIN
FIN409	Financial Modeling and Analysis	3	1	4	Fall	4/Fall	C&E	Mathematical Analysis I&II, Linear Algebra I&II, Probability, Probability and Statistics	FIN
FIN413	Quantitative Investment Analysis	3	1	4	Fall	4/Fall	C&E	Econometrics, Financial Investments	FIN
MA403	Generalized Linear Models	3		3	Spr.	4/Spr.	E	Mathematical Statistics (or Probability and Statistics), and Statistical Linear Models	MATH
MA418	Design of Experiments	3		3	Spr.	4/Spr.	E	Mathematical Statistics (or Probability and Statistics), and Statistical Linear Models	MATH
MA412	Selected Research Topics in Statistics	3		3	Spr.	4/Spr.	C or E or C&E	Probability and Statistics (or Probability Theory & Mathematical Statistics), Statistical Linear Models	MATH
Total		152	15	161					
Note 1: Each student is required to take at least 9 credits (for Mathematical Analysis series) or 11 credits (for Calculus series), of which at least 6 credits need to be taken from such courses as Time Series Analysis, Partial Differential Equations, Computational Finance, Behavioral Finance, Life Insurance Actuarial Science, Applied Financial Statistics and									

Topics on Financial Mathematics.

Note 2: Beginning time for Elective Courses is subject to the actual beginning time.

Table 3: Overview of Practice-Based Courses

Course Code	Course Name	Credits	Lab Credits	Hours/week	Terms	Advised term to take the	Instruction language	Prerequisite	Dept.
MA106	C/C++ Programming language	3	1	4	Spr.	1/Spr.	C	Programming and Database will be helpful but not necessary	MATH
MA108	Programming and Database	3	1	4	Spr.	1/Spr.	C	NA	MATH
MA211	Data structure and algorithms	3	1	4	Fall	2/Fall	C	Programming and Database or C/C++ Programming language	MATH
MA207	Mathematical Experiments	3	1	4	Fall	2/Fall	C&E	Mathematics Analysis I&II (or Calculus I & II), Linear Algebra I	MATH
GE106	Computer System Design and Application	3	1	4	Spr.	2/Spr.			Comp. Sci.& Eng.
FIN208	Financial data analysis and Data Mining	3	1	4	Spr.	2/Spr.	C&E	NA	FIN
MA331	Parallel Computing	3	1	4	Fall	3/Fall	C	Data structure and algorithms	MATH
FIN307	Database Management Systems and Financial Applications	3	1	4	Fall	3/Fall	C&E	Computer System Design and Application	FIN
FIN309	Artificial Intelligence and Financial Applications	3	1	4	Fall	3/Fall	C&E	Basis of computer programming, Data structure and algorithms	FIN
MA308	Statistical Computation and Software	3.5	0.5	4	Spr.	3/Spr.	C or E or C&E	Probability and Statistics (or Probability Theory & Mathematical Statistics)	MATH
FIN302	Empirical Methods in Finance	3	1	4	Spr.	3/Spr.	C&E	Econometrics, Options, Futures and Financial Derivatives	FIN
MA409	Statistical Data Analysis with SAS	3.5	0.5	4	Spr.	4/Fall	C or E or C&E	Probability and Statistics (or Probability Theory & Mathematical Statistics), Statistical Linear Models	MATH
FIN403	Cases in Financial Innovations	3	1	4	Spr.	4/Fall	C&E	Options, Futures and Financial Derivatives	FIN
FIN405	China Economics and Finance	2	1	3	Spr.	4/Fall	C&E	Financial Economics	FIN

FIN409	Financial Modeling and Analysis	3	1	4	Spr.	4/Fall	C&E	Mathematical Analysis I&II, Linear Algebra I&II, Probability, Probability and Statistics	FIN
FIN413	Quantitative Investment Analysis	3	1	4	Spr.	4/Fall	C&E	Econometrics, Financial Investments	FIN
MA490	Undergraduate Thesis/Project	8	8	16	Fall & Spr.	4/Spr.&Fall	C&E		MATH
MA480	Research Projects*	2	2	4	Fall or Spr. or Smr.	Any semester after the first school year	C&E		MATH
MA470	Internship*	2	2	16	Smr.	Any summer after the first school year	C&E		MATH
Total		60	27	99					
<p>*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. Students can also choose to carry out Research Projects and Internship in any semester after the first school year, and the minimum required period for Internship is 4 weeks.</p>									

Table 4: Overview of Course Hours and Credits

Scheme 1: Taking courses in Mathematical Analysis series

	Total Course Hours	Total Credits	The Minimum Credit Requirement
General Education (GE) Required Courses	1040	58.5	58.5
General Education (GE) Elective Courses	2144	134	10
Major Foundational Courses	192	14	14
Major Core Courses	640	45	45
Major Elective Courses	2576	152	9
Undergraduate Thesis/Projects, Research Projects, Internship	416	12	10
Total	7008	415.5	146.5

Scheme 2: Taking courses in Calculus series

	Total Course Hours	Total Credits	The Minimum Credit Requirement
General Education (GE) Required Courses	1168	66.5	66.5
General Education (GE) Elective Courses	2144	134	10
Major Foundational Courses	64	4	4
Major Core Courses	640	45	45
Major Elective Courses	2576	152	11
Undergraduate Thesis/Projects, Research Projects, Internship	416	12	10
Total	6936	413.5	146.5