

Department of Finance

Program of Financial Engineering for International Students (2022)

I. Introduction

The rapid development of financial technology has changed the existing financial ecosystem. It is affecting, in every way, the payment method, financial innovation, market operation, service providing, and regulation rules. As a cross-sectional discipline, financial technology is innovating global financial industry. By combining the information science and data science, this new discipline is implementing cutting edge achievements of those areas and will make a big difference in improving the efficiency of the finance market. With this background, SUSTC creatively launches the major of Financial Technology to fit this big environment.

The graduates from this major will have excellent quantitative and technical skills to meet the requirements of the diversified roles in the financial industry, such as in the field of investment banks, commercial banks, asset management, government regulation, Internet finance, and etc. Graduates will also be prepared to continue with a further study in the area of, but not limited to, finance, business analysis, computer science and information engineering.

Following SUSTC's philosophy, "innovative, high-end, cutting-edge, international", this major will fit to the reality of China's finance reform and development. At the same time, the major will also meet to the needs of the latest research dynamic, nation's development strategy, and the development of Perl River Delta and Shenzhen City. With the strong supports from our excellent faculties, facilities, and research achievements, the major's main teaching and research interests will focus on electronic currency technology, finance information science, internet finance, intelligent investment, financial big data and etc. These achievements will make a contribution to China's finance reform and development, as well as to financial innovation in Perl River Delta and Shenzhen City.

Academic subject area: Finance; Program code: 020302

II. Objectives and Learning Outcomes

1. Objectives

The target of the major is to provide the excellent education to financial technology talents. With well-designed text books and curriculums, the major will efficiently help the students develop core skills to apply to the real problems with the professional knowledge that they have learned in the classes. The students in the major will: meet the needs of socialist market economic construction; comprehensively develop in moral, intellectual, physical and aesthetic aspects; adapt to the open economic environment, and build solid foundations in economics, finance, computer technology and English; master the basic theory and method of financial technology; have a good ideological, business, cultural and psychological quality; have a strong practical, innovation and application ability; be able to work in the frontier areas of innovation such as digital currency, electronic payment, intelligent investment, financial big data and etc.

2. Learning Outcomes

1) Have a basic understanding of classic theory, growth theory and business cycles theory, should be able to employ qualitative and quantitative methods to analyze and explain to others how various behaviors of economic agents and government policies can be explained by economics. Understand the challenges, practical significance and future impact of financial technology on the traditional financial industry. Understand the major areas of financial technology, the developments in various fields and their application scenarios. Understand the possibilities and opportunities that financial technology provides for the future development of the financial industry. Implement the key technologies of existing financial technology from the perspective of different financial industry.

2) Students will be able to explain basic Corporate Finance concepts, such as time value of money and risk-return trade-off, evaluate firms' capital budgeting projects, dividend policy and capital structure, Read and analysis financial statements. Evaluate financial statements of a listed company. Students should master basic data structures and algorithms. In addition, they should be also to choose reasonable data structures according to practical demand of algorithms. Students should master basic data structures and algorithms. In addition, they should be also to choose reasonable data structures according to practical demand of algorithms.

3) Students should master basic theories and technologies of artificial intelligence. In addition, they should be also to apply such theories and technologies to develop simple financial intelligent systems. Describe the target and requirements for a spectrum of business data analysis and data mining problems in finance, marketing, etc. Develop the ability to employ data mining

algorithms to discover patterns in data to address the selected problems. Creatively apply and adapt the introduced modeling techniques to propose original findings for practical organizational data analysis problems. Creatively communicate analytic procedure and results effectively in presentations with oral, written, and electronic formats.

III. Study Length, Degree, and Graduation Requirements

1. Study length: 4 years. The academic credit system of SUSTech allows flexible study years, but not less than 3 years or more than 6 years
2. Degree conferred: Students who complete and meet the degree requirements of the undergraduate program will be awarded a bachelor's degree in Economics.
3. The minimum credit requirement for graduation: 152 credits. The specific requirements are as follows.

Module		Category	Minimum Credit Requirement
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
		Chinese Studies	2
		Foreign Languages	14
	Humanities and Social Sciences Module	Humanities	6
		Social Sciences	
	Mathematics and Natural Sciences Module	Mathematics	12
Physics		10	
Chemistry		3	
Biology		3	
Introduction to Majors Module	Introduction to Majors	2	
Major Courses	Major Required Courses	Major Foundational Courses	24
		Major Core Courses	21
		Practice-based Learning (Undergraduate Thesis, Internships, Research projects, etc.)	17
	Major Elective Courses	Major Elective Courses	11
Total			152
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 & Chinese Studies & Writing) , Humanities and Social Sciences Module, and Introduction to Majors 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	1 Fall		Department of Mathematics
	MA127	Calculus II	4	1 Spring	Calculus I	
	MA113	Linear Algebra	4	1 Spring & Fall		
Physics	PHY105	College Physics I	4	1 Fall		Department of Physics
	PHY106	College Physics II	4	1 Spring	College Physics I	
	PHY104B	Experiments of Fundamental Physics	2	1-2 Spring & Fall		
Chemistry	CH105	Chemistry: The Central Science	3	1-2 Spring & Fall		Department of Chemistry
Biology	BIO102B	Introduction to Life Science	3	1-2 Spring & Fall		Department of Biology
Computer Programming	CS112	Introduction to Python Programming	3	1-2 Spring & Fall		Dept. of Computer Science and Engineering

Note:

1. Mathematics: MA101a Mathematical Analysis I and MA102a Mathematical Analysis II can replace MA117 Calculus I and MA127 Calculus II; MA118 Single-variable Calculus can replace MA113 Linear Algebra.
2. Physics: PHY101 General Physics I and PHY102 General Physics II can replace PHY105 College Physics I and PHY106 College Physics II.
3. Chemistry: CH103 General Chemistry can replace CH105 Chemistry: The Central Science.
4. Biology: BIO103 Principles of Biology can replace BIO102B Introduction to Life Science.
5. Computer Programming: CS109 Introduction to Computer Programming / CS110 Introduction to Java Programming / CS111 Introduction to C Programming / CS113 Introduction to Matlab Programming can replace CS112 Introduction to Python Programming.
6. The replace courses above also apply to the " Prerequisites for Major Declaration ".

V. Prerequisites for Major Declaration

Major Declaration Time	Course Code	Course Name	Prerequisite
Declare major at the end of the first academic year	MA117	Calculus I	
	MA127	Calculus II	Calculus I
	MA113	Linear Algebra	
Declare major at the end of the second academic year	MA117	Calculus I	
	MA127	Calculus II	Calculus I
	MA113	Linear Algebra	
	FIN102/FET205	Finance/ Introduction to Accounting	
	CS112	Introduction to Python Programming	
Note:			
<ol style="list-style-type: none"> 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. 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. 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). 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). 			

VI: Major Course Arrangement

Table 1: Major Required Courses

Program of Financial Engineering

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	FIN201	Microeconomics	3	0	1 Fall & Spring		Dept. of Finance
	FIN204	Macroeconomics	3	0	1 Fall & Spring		
	MA212	Probability and Statistics	3	0	2 Fall & Spring	Calculus II	Dept. of Mathematics
	FIN203	Financial Accounting	3	0	2 Fall		Dept. of Finance
	FET206	Data Structures and Financial Applications	3	0	2 Spring	Introduction to Python Programming	
	FIN215	Political Economics	3	0	2 Fall		
	FIN206	Corporate Finance	3	0	2 Fall		
	FIN303	Econometrics	3	0	3 Fall	Microeconomics, Macroeconomics, Probability and Statistics	
	Total			24	0		
Major Core Courses	FET102	Principles of Fintech	3	0	2 Fall		Dept. of Finance
	FIN301	Financial Investments	3	0	3 Fall	Microeconomics, Macroeconomics, Probability and Statistics	
	FIN311	Artificial Intelligence and Its Applications in Finance	3	0	3 Fall	Introduction to Python Programming	
	FIN409	Financial Modeling and Analysis	3	0	3 Fall	Probability and Statistics	
	FET306	Business Analytics with Big Data	3	1	3 Spring		
	FET303	Financial Risk Management	3	0	3 Spring	Corporate Finance, Probability and Statistics	
	FIN305	Options, Futures and Financial Derivatives	3	0	3 Spring	Corporate Finance, Financial Investments	
	Total			21	1		
Practice-based Courses	FETS301	Internship	3	3	3 Summer		Dept. of Finance
	FET470	Practice of Financial Theory	2	2	ANY		
	FIN491	Thesis	12	12	4 Spring		
	Total			17	17		

Total	62	18	
Note: MA211 Data structure and Algorithms / CS203B Data Structures and Algorithm Analysis B / Data Structures and Algorithm Analysis can replace FET206 Data Structures and Financial Applications; FMA301 Econometrics can replace FIN 303 Econometrics; FMA304 Asset Pricing and Risk Management can replace FET 303 Financial Risk Management; CS303B Artificial Intelligence B can replace FIN311 Artificial Intelligence and Its Applications in Finance			

Table 2: Major Elective Courses

Program of Financial Engineering

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
FIN101	Finance Marketing	3	0	1 Fall		Dept. of Finance
MA201b	Ordinary Differential Equations B	4	0	2 Fall	Calculus II	Dept. of Mathematics
FIN213	Financial Markets and Institutions	3	0	2 Fall		Dept. of Finance
FIN209	Entrepreneurial Finance and Innovation I	3	0	2 Fall		
FET219	Life Contingencies Practicum	1	1	2 Fall		
FIN217	Investment and Risk Management	1	1	2 Fall		
FET202	Cases in FinTech I	1.5	0	2 Fall		
FIN218	Managerial Accounting	3	0	2 Fall	Financial Accounting	
FIN205	Special Topics in Finance and Entrepreneurship I	1.5	0	2 Fall		
FET204	Commercial Bank	3	0	2 Fall		
FIN210	Economics of Money and Banking	3	0	2 Spring		
FIN202	Special Topics in Finance and Entrepreneurship II	1.5	0	2 Spring		
FET301	Cases in FinTech II	1.5	0	2 Spring		
FIN214	Securities Investment Practicum	1	1	2 Spring		
FIN5022	Financial Statement Analysis	3	0	2 Spring	Microeconomics, Macroeconomics, Corporate Finance	
MA208	Applied Stochastic Processes	3	0	2 Spring	Probability and Statistics	
FIN411	International Finance	2	0	3 Spring	Corporate Finance, Financial Investments	
FIN417	Corporate Finance Case analysis	3	0	3 Fall	Microeconomics, Macroeconomics, Corporate Finance	
FIN307	Database Management Systems and Financial Applications	3	1	3 Fall		
FIN5017	Financial Time Series	3	0	3 Fall	Microeconomics, Macroeconomics, Probability and Statistics	

FIN314	Frontier and Practice of Securities Market	1	1	3 Fall	Microeconomics, Macroeconomics	
MA228	Nonlife Actuarial Models	3	0	3 Fall	Probability and Statistics	Dept. of Mathematics
MA303	Partial Differential Equations	3	0	3 Fall	Ordinary Differential Equations B	
FMA303	Security Investments	3	0	3 Fall	Probability and Statistics	
MA322	Life Insurance Actuarial Science	3	0	3 Spring	Probability and Statistics	
FIN312	Actuarial Modelling with Applications in Insurance	3	0	3 Spring	Econometrics, Probability and Statistics	
FIN302	Empirical Methods in Finance	3	0	3 Spring	Financial Investments, Econometrics	Dept. of Finance
FIN208	Financial data analysis and Data Mining	3	1	3 Spring	Probability and Statistics	
FIN407	Investment Banking	3	0	3 Spring	Corporate Finance	
FIN306	Fixed Income: Models and Applications	2	0	3 Spring	Options, Futures and Financial Derivatives	
FIN308	Financial Economics	3	0	3 Spring	Corporate Finance, Probability and Statistics	
MA308	Statistical Computation and Software	3	0	3 Spring	Probability and Statistics	
MA304	Multivariate Statistical Analysis	3	0	3 Spring	Probability and Statistics	
FIN403	Cases in Financial Innovations	3	0	4 Fall		Dept. of Finance
FIN5011	Quantitative Investment Analysis	3	0	4 Fall	Financial Investments, Econometrics	
FIN310	China Economics and Finance	3	0	3 Spring	Microeconomics, Macroeconomics, Corporate Finance, Financial Investments	Dept. of Finance
Total		93	6			

Note: A minimum of 11 credits MUST be taken to fulfill Major Elective Courses

MA201a Ordinary Differential Equations A can replace MA201b Ordinary Differential Equations B;

MA309 Time Series Analysis can replace FIN5017 Financial Time Series;

CS307 Principles of Database Systems/ MIS205 Data Management and Databases can replace FIN307 Database Management Systems and Financial Applications.

Table 3: Overview of Practice-based Learning

Program of Financial Engineering

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
CS112	Introduction to Python Programming	3	1	1-2 Spring & Fall		Dept. of Computer Science and Engineering
PHY104B	Experiments of Fundamental Physics	2	2	1-2 Spring & Fall		Dept. of Physics
FET219	Life Contingencies Practicum	1	1	2 Fall		Dept. of Finance
FIN217	Investment and Risk Management	1	1	2 Fall		
FIN214	Securities Investment Practicum	1	1	2 Spring		
FIN307	Database Management Systems and Financial Applications	3	1	3 Fall		
FIN314	Frontier and Practice of Securities Market	1	1	3 Fall	Microeconomics, Macroeconomics	
FET306	Business Analytics with Big Data	3	1	3 Spring		
FIN208	Financial data analysis and Data Mining	3	1	3 Spring	Probability and Statistics	
FETS301	Internship	3	3	3 Summer		
FET470	Practice of Financial Theory	2	2	ANY		
FIN491	Thesis	12	12	4 Spring		
Total		35	27			

Curriculum Structure of Financial Engineering

Freshman	Sophomore	Junior	Senior
General Education Courses	General Education Courses	General Education Courses	General Education Courses
Microeconomics	Political Economics	Financial Investments	Quantitative Investment Analysis
Macroeconomics	Commercial Bank	Options, Futures and Financial Derivatives	Projects of Science and Technology Innovation
Probability and Statistics	Financial Statement Analysis	China Economics and Finance	Thesis
Principles of Fintech	Financial Markets and Institutions	Empirical Methods in Finance	
	Financial Accounting	Corporate Finance Case analysis	
	Corporate Finance	Financial Economics	
	Economics of Money and Banking	Financial Modeling and Analysis	
		Econometrics	
		Internship	
Note: The above is the recommended semester. Students can make adjustments according to their own academic plans.			