Department of Statistics and Data Science

Program of Statistics for International Students (2022)

I. Introduction

Established in April 2019, the Department of Statistics and Data Science aims to build up a world-class educational training and research center. The department is committed to cultivating top-notch talents with solid scientific knowledge, active thoughts, innovative awareness, and global vision. Until June 2022, the department has 15 full-time (2 of them will join soon) and 5 jointly appointed faculty members, including 4 Chair Professors, 4 Professors, 5 Associate Professors, 7 Tenure-track Assistant Professors and 1 Visiting Assistant Professor. All faculty members have extensive overseas study or work experiences. One member is an invited speaker at the International Congress of Mathematics, and IMS Medallion Lecturer. Two members are the winners of the prestigious State Natural Science Award (2nd class). At present, the department has two undergraduate programs, namely the Program of Statistics and the Program of Data Science and Big Data Technology, as well as two graduate programs (M.Phil. and Ph.D.), which cover a broad array of research areas including Biostatistics, Clinical Trial Design, High Dimensional Data Analysis, Random Matrix, Time Series Analysis, Bayesian Statistics, Financial Statistics, Limit Theory in Probability and Statistics, Data Science and Big Data Technology. Statistics is applied extensively in various disciplines, from natural sciences (like physics, chemistry, biomedicine, etc.) to social sciences and humanities, as well as business and government decision-making. The undergraduate program of Statistics focuses on applying probability theory to establish statistical models based on the collected data, conduct quantitative analysis, and make inferences and predictions to serve as the reference for decision-making.

Academic subject area: Statistics; Program code: 071201

II. Objectives and Learning Outcomes

1. Objectives

The objective for international undergraduates majoring in statistics is to cultivate professional

talents who are interested in statistical research or data analysis. International undergraduates in this major will have a solid theoretical foundation in mathematics and statistics, proficient computer programming skills, and be good at statistical modeling and analysis of real data. Moreover, they will be able to conduct further research related to statistics or engage in data analysis, data mining, statistical investigate, statistical information management in enterprises and government departments. In the era of big data, statistics faces a wealth of opportunities and challenges. Graduates of statistics major will have a strong theoretical background in statistics and a broad range of knowledge to seize the opportunities and meet the challenges.

2. Learning Outcomes

2.1 Students should have a solid mathematical foundation, master the basic knowledge and theories of statistics, and understand the basics of natural science, social science, engineering technologies related to biomedical statistics, social economic statistics, industrial statistics, etc.

2.2 Students should be able to proficiently read statistical literature in English, master the principal methods of literature search, information retrieval, and data query with modern information technology.

2.3 Students should be equipped with the essential skills of applying statistical knowledge and principles to analyze and solve practical problems. These skills include but are not limited to experience in using computer (including commonly used tools, programming languages, and statistical software) and writing simple programs; design questionnaires, conduct survey, collect and process survey data; good communication skills and teamwork spirit.

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 Science

3. The minimum credit requirement for graduation: 145 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	12
		Major Core Courses	18
		Practice-based Learning (Undergraduate Thesis, Internships, Research Projects, etc.)	14
	Major Elective Courses	Major Elective Courses	22
Total Credits			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 & 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	Department
Mathematics	MA101a / MA117	Mathematical Analysis I / Calculus I	5/4	1 Fall	None	Mathematics
	MA102a / MA127	Mathematical Analysis II / Calculus II	5/4	1 Spring	MA101a/ MA117	Mathematics
	MA107 / MA113	Advanced Linear Algebra I / Linear Algebra	4	1 Fall / 1 Fall-Spring	None	Mathematics
Physics	PHY101/ PHY105	General Physics I / College Physics I	5/4	1 Fall	None	Physics
	PHY102/ PHY106	General Physics II/ College Physics II	5/4	1 Spring	PHY101/ PHY105	Physics
	PHY104B	Experiments of Fundamental Physics	2	1-2 Spring & Fall	None	Physics
Chemistry	CH103/ CH105	General Chemistry/ Chemistry: The Central Science	3	1-2 Spring & Fall	None	Chemistry
Biology	BIO103/ BIO102B	Principles of Biology/ Introduction to Life Science	3	1-2 Spring & Fall	None	Biology
Computer Programming	CS109/ CS110/ CS111/ CS112	Introduction to Computer Programming/ Introduction to Java Programming/ Introduction to C Programming/ Introduction to Python Programming	3	1-2 Spring & Fall	None	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	MA101a	Mathematical Analysis I	
	MA102a	Mathematical Analysis II	MA101a
	MA107 / MA113	Advanced Linear Algebra I / Linear Algebra	
	PHY101 / PHY105	General Physics I / College Physics I	
	PHY102 / PHY106	General Physics II / College Physics II	PHY101 / PHY105
	CS109/ CS110/ CS111/ CS112	Introduction to Computer Programming/ Introduction to Java Programming/ Introduction to C Programming/ Introduction to Python Programming	
Declare Major at the End of the Second Academic Year	MA101a / MA117	Mathematical Analysis I / Calculus I	None
	MA102a / MA127	Mathematical Analysis II / Calculus II	MA101a / MA117
	MA107 / MA113	Advanced Linear Algebra I / Linear Algebra	None
	PHY101 / PHY105	General Physics I / College Physics I	None
	PHY102 / PHY106	General Physics II / College Physics II	PHY101 / PHY105
	PHY104B	Experiments of Fundamental Physics	None
	CH103 / CH105	General Chemistry / Chemistry: The Central Science	None
	BIO103 / BIO102B	Principles of Biology / Introduction to Life Science	None
	CS109/ CS110/ CS111/ CS112/	Introduction to Computer Programming/ Introduction to Java Programming/ Introduction to C Programming/ Introduction to Python Programming	None

Note:

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 Statistics

Course Category	Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
Major Foundational Courses	MA215 / STA203	Probability Theory / Foundation of Probability Theory	4	0	2 Fall	MA102a / MA127 & MA113	Mathematics / Statistics and Data Science
	MA203a / MA231 / MA213-16	Mathematical Analysis III / Mathematical Analysis III (H) / Mathematical Analysis	5	0	2 Fall	MA102a / MA127	Mathematics
	MA204	Mathematical Statistics	3	0	2 Spring	MA215 / STA203 / MA212	Statistics and Data Science
	Total		12	0			
Major Core Courses	STA201	Operational Research and Optimization	3	0	2 Spring	MA107 / MA113	Statistics and Data Science
	MA329	Statistical Linear Models	3	0	3 Fall	MA204 / MA212	Statistics and Data Science
	MA309	Time Series Analysis	3	0	3 Fall	MA204 / MA212	Statistics and Data Science
	MA308	Statistical Computation and Software	3	0	3 Fall	MA204 / MA212	Statistics and Data Science
	MA304	Multivariate Statistical Analysis	3	0	3 Spring	MA204 / MA212	Statistics and Data Science
	MAT7104	Bayesian Statistics	3	0	3 Spring	MA329	Statistics and Data Science
	Total		18	0			
Practice-based Courses	STA490	Undergraduate Thesis/Project	12	12	4 Fall & Spring		Statistics and Data Science
	STA480	Research Projects	2	2	Any semester after the first academic year		Statistics and Data Science
	STA470	Internship	2	2	Any summer after the first academic year		Statistics and Data Science
	Total		14	14			
Total			44	14			

Note:
Students are required to choose Research Projects (including all kinds of scientific research activities, scientific and technological innovation projects, wining 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 Statistics

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Department
MA109 / MA111 / MA121	Advanced Linear Algebra / Advanced Linear Algebra II / Advanced Linear Algebra II (H)	4	0	1 Spring	MA113	Mathematics
CS203B	Data Structures and Algorithm Analysis B	3	1	2 Fall	CS205	Computer Science and Engineering
MA201a / MA230	Ordinary Differential Equations A / Ordinary Differential Equations A (H)	4	0	2 Spring	(MA203a / MA213-16) & (MA109 / MA111 / MA121)	Mathematics
MA206	Mathematical Modeling	3	0	2 Spring	MA201a / MA230 / MA201b	Mathematics
MA208	Applied Stochastic Processes	3	0	3-4 Spring	MA203a/ MA213-16 & MA215/ MA212 & (MA109/MA111/MA121)	Mathematics
MA214 / MA219	Abstract Algebra / Abstract Algebra (H)	3	0	2 Spring	MA109 / MA111/ MA121	Mathematics
MA202 / MA232	Complex Analysis / Complex Analysis (H)	3	0	2 Spring	MA203a / MA213-16	Mathematics
MA322	Life Insurance Actuarial Science	3	0	2 Spring	MA215 / MA212	Mathematics
MAS221	The Basic Principle of Statistical Learning	2	0	2 Summer	MA215 / MA212	Mathematics
MA228	Nonlife Actuarial Models	3	0	3 Fall	MA215 / MA212	Mathematics
MA303	Partial Differential Equations	3	0	3 Fall	MA201a / MA201b	Mathematics
MA301	Real Analysis	3	0	3 Fall	MA203a / MA213-16	Mathematics
MA305	Numerical Analysis	3	0	3 Fall	MA203a / MA213-16	Mathematics
STA322	Sample Surveys and Experimental Design	3	0	3-4 Spring	MA204 / MA212	Statistics and Data Science
MA333	Introduction to Big Data Science	3	0	3 Spring	MA215 / MA212	Mathematics
MA417	Nonparametric Statistics	3	0	3 Spring	MA212 / MA204	Statistics and Data Science
MAT7101	Generalized Linear Models	3	0	3 Spring	MA329	Statistics and Data Science
MA325	Numerical Solution of Partial Differential Equations	3	0	3 Spring	MA303	Mathematics
MAT7002	Measure Theory and Integration (PG)	3	0	4 Fall	MA302	Mathematics
MAT8031	Advanced Statistics (PG)	3	0	4 Fall	MA204	Statistics and Data Science
CS405	Machine Learning	3	1	4 Fall	MA107A & MA212	Computer Science and Engineering
MAT7035	Computational Statistics	3	0	3 Fall	MA204	Statistics and Data Science
MA405	Survival Analysis	3	0	4 Fall	MA329	Statistics and Data Science
MA409	Statistical Data Analysis with SAS	3	0	3 Spring	MA329	Statistics and Data Science

MAT8011	Advanced Probability	3	0	4 Fall	MA329	Mathematics
MAT7029	Stochastic Analysis	3	0	4 Spring	MA215 & MA301	Mathematics
MAT7102	Topics in Probability and Statistics	3	0	3 Spring	MA204	Statistics and Data Science
STA404	Network Science and Computing	3	0	3 Spring	MA204	Statistics and Data Science
STA217	Introduction to Data Science	3	0	2 Fall	MA102a / MA102B	Statistics and Data Science
STA435	Statistical Writing and Communication in English	3	0	3-4 Spring		Statistics and Data Science
Total		94	2			

Note:

1. All major elective courses offered by the Department of Statistics can be certified as “Major Elective Courses” credits of the Statistics major including graduate courses that are open to undergraduates.
2. Students are required to complete at least 22 credits for the Major Elective Courses.

Table 3: Overview of Practice-based Courses

Program of Statistics

Course Code	Course Name	Credits	Practice-based Learning Credits	Terms	Prerequisite	Dept.
STA470	Internship	2	2	Any summer after the first academic year		Statistics and Data Science
STA480	Research Projects	2	2	Any semester after the first academic year		Statistics and Data Science
STA490	Undergraduate Thesis/Project	12	12	4 Fall & Spring		Statistics and Data Science
CS109 / CS110 / CS111 / CS112	Introduction to Computer Programming / Introduction to Java Programming / Introduction to C Programming / Introduction to Python Programming	3	1	1-2 Spring & Fall		Computer Science and Engineering
MA110	MATLAB Programming and Application	3	1	2 Spring		Mathematics
CS205	C/C++ Program Design	3	1	1 Spring		Computer Science and Engineering
CS203	Data Structures and Algorithm Analysis	3	1	2 Fall	CS205	Computer Science and Engineering
CS405	Machine Learning	3	1	4 Fall	MA107A & MA212	Computer Science and Engineering
PHY104B	Experiments of Fundamental Physics	2	2	1 Spring & Fall		
Total		33	23			

Curriculum Structure of Statistics Major

Semester	First Year	Second Year	Third Year	Third/Fourth Year
Fall	Mathematical Analysis I / Calculus I	Mathematical Analysis III / Mathematical Analysis	Statistical Linear Models	Survival Analysis
	Advanced Linear Algebra I / Linear Algebra	Probability Theory / Foundation of Probability Theory	Time Series Analysis	Computational Statistics
		Fascinating Statistics	Statistical Computation and Software	Real Analysis
		Introduction to Data Science	Statistical Learning	Advanced Statistics
Spring	Mathematical Analysis II / Calculus II	Mathematical Statistics	Multivariate Statistical Analysis	Undergraduate Thesis/Project
	Linear Algebra	Operational Research and Optimization	Bayesian Statistics	Research Projects or Internship (Any summer after the first school year)
	Fascinating Statistics	Ordinary Differential Equations A	Statistical Data Analysis with SAS	Sample Surveys and Experimental Design
		Introduction to Big Data Science	Generalized Linear Models	Nonparametric Statistics
			Statistical Writing and Communication in English	Selected Research Topics in Statistics
				Network Science and Computing
				Applied Stochastic Processes