Economic Mathematics

Fudan University

Department: School of Economics

Course Code	MATH120017		
Course Title	Economic Mathematics Ⅱ		
Credit	5	**Credit Hours**	90
Course Nature	□Specific General Education Courses □Core Courses □General Education Elective Courses □Basic Courses in General Discipline √ Professional Compulsory Courses □Professional Elective Courses □Others		
Course Objectives	After you finish the course, you are supposed to ● Develop a deep understanding of probability and statistics and a solid intuition for statistical concepts. ● Learn how the mathematical ideas of statistics carry over into the world of applications in economics and finance.		
Course Description	Economic Mathematics II is the first course of the advanced undergraduate econometrics sequence in School of Economics, Fudan University. It provides an introduction to probability theory and statistics. Why do we need to teach probability and statistics to undergraduate students in economics? Put it simply, it provides necessary probability and statistics background for undergraduate for their courses in econometrics, microeconomics, and macroeconomics. Statistics and mathematics are two basic analytic tools in economics. Statistics is an essential tool to study situations involving uncertainties, in the same way as calculus is essential to characterize optimizing behaviors in economics. For example, probability theory is needed in study of game theory. In macroeconomics, as Robert Lucas points out, the introduction of stochastic factors can provide much new insights into dynamic economic systems. Indeed, probability and statistics are necessary analytic tools in every field of economics. Of course, the demand for probability and statistics varies from field to field in economics, with econometrics most heavily using it. The analysis will be conducted in a relatively rigorous manner. Formal proofs will be given for some important theorems, because the proofs themselves can aid understanding and in some cases, the proof techniques or methods have practical value. In addition to developing a fundamental understanding of probability and		

	mathematical statistics that are most relevant to modern econometrics, this course also tries to develop a sound intuition for statistical concepts from economic perspective. For example, why are statistical concepts (e.g., mean and variance) useful in economics? What are economic intuition and interpretation for the probability and statistical relations?

Course Requirements:

Prerequisites:

Economic Mathematics I (EC103). The course is self-contained.

Teaching Methods:

Lectures and homework assignments.

Instructor's Academic Background:

Fu Zhonghao, Ph.D in Economics, Cornell University, 2017

Members of Teaching Team

Name	Gender	Professional Title	Department	Responsibility
Fu Zhonghao	Male	Lecturer	International Finance	Lectures

Course Schedule

Chapter 1: Introduction to Econometrics

Chapter 2: Foundation of Probability Theory (6 hours)

2.1 Random Experiments
2.2 Basic Concepts of Probability
2.3 Fundamental Probability Laws
2.4 Conditional Probability and Independence
2.5 Bayes' Rule

Homework 1 is assigned.

Chapter 3: Random Variables and Probability Distributions (3 hours)

3.1 Random Variables and Distribution Functions
3.2 Discrete Random Variable
3.2 Continuous Random Variables
3.3 Functions of a Random Variable
3.4 Joint Probability Distribution
3.5 Conditional Probability Distribution
3.6 Independence

Homework 2 is assigned.

Chapter 4: Mathematical Expectations (3 hours)

4.1 Univariate Mathematical Expectations
4.2 Moments and Moment Generating Function
4.3 Multivariate Mathematical Expectations
4.4 Covariance and Correlation
4.5 Conditional Expectations and Conditional Moments

Homework 3 is assigned.

Chapter 5: Introduction to Sampling Theory and Statistics (3 hours)

5.1 Normal Distribution
5.2 Student's t Distribution
5.3 Snedecor's F Distribution
5.4 Chi-square Distribution
5.5 Central Limit Theorem
5.6 Population and Random Sample
5.7 Sampling Distribution of Sample Mean
5.8 Sampling Distribution of Sample Variance

Homework 4 is assigned.

Chapter 6: Parameter Estimation and Evaluation (6 hours)

6.1 Population and Parameter Estimation
6.2 Point Estimators and Mean Squared Error Criterion
6.3 Best Unbiased Estimators
6.4 Confidence Interval Estimators

Homework 5 is assigned.

Chapter 7: Hypothesis Testing (6 hours)

7.1 Introduction to Hypothesis Testing

7.2 Hypothesis Testing for Population Mean

7.3 Hypothesis Testing for Population Variance

Homework 6 is assigned.

Chapter 8: Conclusion (6 hours)

Final Exam

The design of class discussion or exercise, practice, experience and so on:

No class discussion. TA session will be given for problem solving and practice.

Grading & Evaluation：

Homework: 10%

Midterm: 35% , closed-book

Final: 55% , cumulative, closed-book

Passing grade: 60, below 60 = fail

Teaching Materials & References：

Walpole, Myers, Myers and Ye., Barry, Probability and Statistics for Engineers and Scientists, Pearson, 2016.