

Understanding Mathematics

Department: Fudan International Summer Session

Course Code	MATH170001		
Course Title	Understanding Mathematics		
Credit	2	Credit Hours	36+3 (one credit hour is 45 minutes)
Course Nature	<input type="checkbox"/> Specific General Education Courses <input type="checkbox"/> Core Courses <input checked="" type="checkbox"/> General Education Elective Courses <input type="checkbox"/> Basic Courses in General Discipline <input type="checkbox"/> Professional Compulsory Courses <input type="checkbox"/> Professional Elective Courses <input type="checkbox"/> Others		
Course Objectives	This course aims to provide an introduction of the fundamental concept and analytical tools in mathematics to the undergraduate students majoring in mathematics, sciences, engineering and economics.		
Course Description	This course contains basic ideas and knowledge in number theory, set theory, limit, calculus, analysis, differential equation and probability. Part of the results will be given a rigorous proof to show you what the real mathematics is. To take this course, students are only assumed to have known elementary mathematics included in high school and minimum knowledge of undergraduate mathematics and most importantly be interested in mathematics.		
Course Requirements:			
The study of this course involves attending lectures, discussing key concepts and its real life applications. Homework problem sets are expected to be discussed in groups but completed independently.			
Teaching Methods:			
lectures			
Instructor's Academic Background:			
Jiangang Ying: Professor at School of mathematics, Fudan University PhD in mathematics, UC San Diego, 1993 Email: jgying@fudan.edu.cn			

Course Schedule:

- 1 Introduction: set and mapping, one-to-one correspondence, how to compare infinite sets?
- 2 Integers: prime numbers, Euclid theorem: there are infinite prime numbers, the basic theorem of integers
- 3 Real numbers: rational and irrational numbers
- 4 Inequalities: mean value inequality and Cauchy inequality, extremal problems
- 5 Calculus: limits, euler's number, Fibonacci sequence
- 6 Calculus: derivatives and finding extreme values
- 7 Calculus: area and integration, Fundamental theorem of calculus
- 8 Series: harmonic series, convergence and divergence
- 9 Introduction to ODEs: how to solve a differential equation?
- 10 Probability: random phenomena and classical probability problems
- 11 Probability: distribution, expectation, law of large numbers (binomial, geometric)
- 12 Expectation and deviation, Saint Petersburg's paradox

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

Lectures, quizzes, homework, and final exam.

Grading & Evaluation:

Homework and midterm: 40%

Final exam: 60%

There will be no make-up exam

Teaching Materials & References (Including Author, Title, Publisher and Publishing time):

Lecture Notes <understanding mathematics>, by instructor.