

Course Description

Department of Mathematics

Nature of the course <input type="checkbox"/> required <input checked="" type="checkbox"/> elective		Area 麻煩老師勾選類別，或直接填寫			
		<input type="checkbox"/> 代數與數論 <input type="checkbox"/> 分析 <input type="checkbox"/> 幾何與拓樸 <input type="checkbox"/> 計算與應用數學 <input checked="" type="checkbox"/> 機率 <input type="checkbox"/> 統計 <input type="checkbox"/> 離散數學 <input type="checkbox"/> 其他 <input type="checkbox"/> 論文研討、獨立研究			
Course number	免填	Section number		Number of credits	3
Course title	(中文) 數理金融導論 (英文) <i>Introduction to Mathematical Finance</i>				
Instructor	韓傳祥 Chuan-Hsiang Han				

I. Contents :

The goal of this course is to introduce the interplay between financial derivative markets and mathematics. This course is offered for junior undergraduate students or levels above. It can be used as an elementary course before students move into the graduate-level course financial mathematics 金融數學. The outline of this course contents is as follows

1. History of Modern Finance: Financial Markets and Stochastic Theories
2. Review of Probability Theory
3. Random Walk: Markov Property and Martingale [Discrete-Time Stochastic Process]
4. Brownian Motion & Stochastic Calculus [Continuous-Time Stochastic Process]
5. Option Pricing Theory (I): No Arbitrage Argument
6. Option Hedging Performance: Delta and Gamma/Delta Strategies
7. Option Pricing Theory (II): Risk-Neutral Evaluation [Change of Probability Measure]
8. Volatility Index–VIX: Market Filter
9. Feynman-Kac Formula: Conditional Expectation and PDE
10. Optional: computational methods (numerical PDE, fast Fourier transform, Monte Carlo simulation)

In addition to the course works, students are required to turn in “biweekly report,” that summarizes supplement materials such as professional magazines or TV channels in order to keep up with the current market movements.

We will arrange at least one field trip to visit financial institutions.

II. Course prerequisite : 機率論與統計學，微分方程 (or equivalent courses)

III. Reference material (textbook(s)) :

Textbook:

韓傳祥. (2012). “隨機金融計算,” 新陸書局。

References:

Steven E. Shreve, “Stochastic Calculus for Finance II: continuous-Time Models,” Springer-Verlag, 2003.

Davis, M. and Etheridge, A. (2006) “Louis Bachelier’ s Theory of Speculation: The Origins of Modern Finance,” Princeton University Press.

Engle, R. (2009). “Anticipating Correlations: A New Paradigm for Risk Management,” Princeton University Press.

IV. Grading scheme :

Homework (40%), Midterm and Final Exams (40%), Term Project(20%)

V. Course Goal :

(1) Understand that mathematical finance is the origin of modern finance.