National Cheng Kung University
Modular Course 2025 Summer Program

Academic Year：114, Semester：1 Category：Interdisciplinary Integration

金融數學導論
Introduction to mathematical finance

Instructor	Affiliation	Graduation (Ph.d.)
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Category	Course Credit	Student Size (Maximum)
Interdisciplinary Integration	**1**	**25**

Student Background

College of Science, College of Engineering, College of Bioscience and Biotechnology, College of Electrical Engineering and Computer Science

最好具備基本微積分與機率論概念，雖然老師課程內會介紹基本機率論概念

Difficulty

☐ **Challenging** ☐ **Moderately Difficult** ■ **Medium** ☐ **Entry Level (Basic)**

Format of The Course

Lecture 50%，Implementation 50%

Grading Policy

In class exam 90%: The last class 16:30- 17:40 Written tests

Participation 10%

Code of Conduct for The Course

None

Course Description

We present some basic ideas underlying pricing of options which are financial contracts giving the right to buy or to sell a specific number of stocks or goods at a future time for a fixed price. The present value of the contract depends on interest rates and the future price development of the underlying asset (stock, goods, etc.), which is random. For this one needs therefore to develop specific tools from probability theory to find fair prices which can be agreed upon by both sides (the seller and the buyer). We aim to present the basic ideas and mathematical models leading to the computation of the prices for those financial instruments.

Keywords：Option pricing, financial modelling, Black&Scholes formula

Timetable and Syllabus

Period	Timetable	Syllabus
2025/7/14(MON)	**14:00-17:40**	**Options and present value analysis**
2025/7/15(TUE)	**14:00-17:40**	**Some basic probability theory**

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2025/7/16(WED)	**14:00-17:40**	**Pricing contracts via arbitrage**
2025/7/17(THU)	**14:00-17:40**	**The binomial model and the Black-Scholes formula**
2025/7/18(FRI)	**14:00-16:40**	**Outlook : Exotic options and exotic models**
	16:30- 17:40	**final exam**

Goal of the Course

1. **Knowledge of different option types.**
2. **Understanding of some elementary mathematical models used in option pricing (binomial model, geometric Brownian motion).**
3. **Understanding of the important financial ideas used in option pricing (present value analysis, no arbitrage assumption, perfect market assumption).**
4. **Computation of option prices with the formula of Black and Scholes.**
5. **Computation of option prices through Monte-Carlo simulations.**

The Importance, Cross-Over Disciplinary and Contemporary of The Curriculum

Mathematical finance is a field of applied mathematics concerned with the mathematical modelling of financial markets, which takes observed market prices as input and attempts to compute a theoretical value of derivatives. The fundamental theorem of arbitrage-free pricing is one of the key theorems in mathematical finance, while the Black–Scholes equation and formula are amongst the key results. Those are all covered in this modular course. It is an interdisciplinary subject with its original problem coming from financial markets, mathematical models (basically stochastic ones) for describing the random fluctuation in stock/commodity prices, and computers being the main tools for computing and implementing the techniques. In all business majors, only minimal mathematics is required, but mathematical finance happens to be heavily quantitative. As such, it is very suitable for scientists and engineers to apply their strengths to business studies, while a great improvement for business majors to handle complicated fluctuations with more in-depth quantitative tools.

Remarks

Reference：

An elementary introduction to mathematical finance (Sheldon M. Ross)

本課程若因天災等不可抗力之因素或中央、地方政府公告停課，授課教師需依情況依建議補課方式調整課程進度與補課；若需使用假日、國定假日補課，則需與所有修課學生達成共識方能用例假日補課。

建議補課方式：

1. 線上授課方式補課；
2. 當預期可能會因天災(颱風、超大豪雨…等)宣佈停課時，建議老師先行調整加快課程進度或預先增加可能天氣預警之前幾次課程時數；
3. 停課後隔天起延後下課，補足停課延誤的進度；若停課超過 1 天，則在開始上課後延後下課補課，或當週星期六、日補課；

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更改課程授課方式，例如：DEMO 改以考試、報告、作業取代。