National Cheng Kung University
Modular Courses 2026 Summer Program

Academic Year：115, Semester：1　　Category：Interdisciplinary Integration Courses

金融數學導論
Introduction to mathematical finance

Instructor	Affiliation	Graduation (Ph.D.)
Brice Franke **Brice.Franke@gmail.com**	**Université Bretagne Occidentale**	**Georg-August Universität Göttingen** **(德國哥廷根大學)**

Course Type	Course Credit	Student Size (Maximum)
Lecture + Recitation	1	25

Student Background

College of Science, College of Engineering,
College of Electrical Engineering and Computer Science,
Basic Concept of Probability Theory

Difficulty

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

Format of The Course

Lecture 50%, Hands-on Practice 40%, Quiz 10%

補充說明：quiz主要目的在檢驗自己是否跟上進度，即時修正，避免在最後才一試定成績，請同學要認真看待。

Grading Policy

問題考試90%： 第2~4天的quiz每次佔12.5%，最後考試佔筆試62.5%
出席率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 models leading to the computation of the prices for those financial instruments.

本課程介紹一些選擇權訂價的基本觀念。所謂選擇權是一種金融契約，賦予未來以某特定價格買賣特定數量股票或商品之權利。契約現值取決於利率和標的資產（股票，貨物等等）的未來價格發展，該發展是隨機的。為此我們需要從機率論開發特定工具來找到買方賣方都同意的公平價格。我們的目標是介紹推導這些金融工具計算價格的基本概念與數學模型。

Keywords: Option pricing, financial modelling, Black&Scholes formula
關鍵字：選擇權定價，金融模型，Black&Scholes公式

National Cheng Kung University
Modular Courses 2026 Summer Program

Academic Year：115, Semester：1　　Category：Interdisciplinary Integration Courses

Timetable and Syllabus

Period	Timetable	Syllabus
2026/7/20(Mon)	14:00 – 17:40	Options and present value analysis (講課+演習2h)
2026/7/21(Tue)	14:00 – 17:40	Some basic probability theory (講課+quiz15min+演習1h45)
2026/7/22(Wed)	14:00 – 17:40	Pricing contracts via arbitrage (講課+quiz15min+演習1h45)
2026/7/23(Thu)	14:00 – 17:40	The binomial model and the Black-Scholes formula (講課+quiz15min+演習1h45)
2026/7/24(Fri)	14:00 – 17:40	Outlook : Exotic options and exotic models (講課+Final exam 1h15)

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)
- 老師希望上課同學能同時學習系統性分析推理邏輯能力，而不是照模式解決問題的慣性，請同學務必在演習時間主動參與提問，有問題一定要提出，實作是深化授課內容最好的方式

National Cheng Kung University
Modular Courses 2026 Summer Program

Academic Year：115, Semester：1 **Category：Interdisciplinary Integration Courses**

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；

更改課程授課方式，例如：DEMO 改以考試、報告、作業取代。