

# National Cheng Kung University

## Modular Course 2022 Summer Program

數學金融學導論

### Introduction to mathematical finance

Instructor	Affiliation	Graduation (Ph.d.)
<b>Brice Franke</b>	<b>Université de Bretagne Occidentale (Brest) Departement de Mathematiques</b>	<b>Georg-August Universität Göttingen (德國哥廷根大學)</b>

Course Type	Course Credit	Student Size (Maximum)
<b>Lecture + Recitation</b>	<b>1</b>	<b>25</b>

Student Background

College of Science 、 College of Engineering

Difficulty

Challenging    Medium Well    Medium    Entry Level ( Basic)

Format of The Course

Lecture 100%

Grading Policy

In class exam 80 % , Participation 20%

Note:

第二到第五堂課開始隨堂小考 20~30 分鐘，各佔 20% 評量成績

On Day 2, 3, 4 and 5, the class begins with a quiz for 20-30 minutes. Each quiz accounts for 20% of the final score.

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. One needs therefore to develop specific tools from probability theory to find a fair price 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.

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### Timetable and Syllabus

Peroid	Timetable	Syllabus
8/8(MON)	14:00 - 17:40	Preliminaries in probability theory
8/9(TUE)	14:00 - 17:40	Options and present value analysis
8/10(WED)	14:00 - 17:40	Pricing contracts via arbitrage
8/11(THU)	14:00 - 17:40	Black-Scholes formula and expected utility
8/12(FRI)	14:00 - 17:40	Exotic options and exotic models

### Goal of the Course

1. Knowledge of different option types
2. Understanding some mathematical models underlying option pricing, probabilistic and financial ideas used in option pricing
3. risk-neutral measure, martingales, delta methods, arbitrage, expected utility etc.

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

Mathematical finance is a field of applied mathematics, concerned with mathematical modeling 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 strength to business studies, while a great improvement for business majors to handle complicate fluctuations with more in-depth quantitative tools.

### Remarks

#### References :

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