



The course is designed to provide students with the mathematical background to study modern financial theory. This approach has become extremely important for financial analysts or “QUANT.” We will study in a systematic way to price (evaluate) and hedge (eliminate) risks associated with the uncertainties of asset prices such as stocks, interest rates, credits, energy, loans, insurance, etc.

Instructor: Chuan-Hsiang Han (韓傳祥)

Department of Quantitative Finance, NTHU

Office: Room 756 TSMC Building(台積館)

Phone: 03-5742224

Email: [chhan@mx.nthu.edu.tw](mailto:chhan@mx.nthu.edu.tw)

URL: enter from <http://mx.nthu.edu.tw/~chhan>

Class Time: T7T8T9

Location: TBD

Office Hours: 1000 – 1300 Wednesday or by appointment

Prerequisites:

STAT 3875 (basic knowledge of probability and statistics.)

MATH 2030 Advanced Calculus

Financial Mathematics

Textbooks:

1. Steven E. Shreve, “Stochastic Calculus for Finance II: continuous-Time Models,” Springer-Verlag, 2003.
2. 孫健, “金融衍生品定價模型” 中國經濟出版社, 2007.

References:

1. John Hull, “Options, Futures, and Other Derivatives,” 6th Edition, Prentice Hall.
2. Alison Etheridge, “A Course in Financial Calculus,” Cambridge University Press, 2002.
3. P. Jackel, “Monte Carlo Methods in Finance,” John Wiley & Sons Ltd. 2002.
4. P. Glasserman, Monte Carlo Methods for Financial Engineering, Springer-Verlag, New York, 2003.

## Course Contents:

1. Elementary probability and stochastic processes (convergence of integrals; change of measure; conditional expectation.)
2. Brownian motion (random walk; discrete-time models in finance; martingale property; variations; Markov property.)
3. The Black-Scholes model (stochastic calculus; Ito's lemma; market completeness; pricing partial differential equation; hedging strategy; Brownian bridge.)
4. Risk-Neutral pricing (Girsanov's theorem; martingale representation theorem; fundamental theorems of asset pricing.)
5. Conditional Expectation and PDEs (Feynman-Kac Formula)
6. Simulation and algorithms for financial models.

## Grading:

Assignments 20%, Exams(midterm and final) 60%, Course Project 20%.