Fall 2012 **Stochastic Financial Theory** QF 5003

The course is designed to provide students with a 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) financial derivatives associated with uncertainties of equities bonds, credits, energy, insurance, etc. We shall also introduce some basic ideas of computational finance and financial statistics.

Instructor: Chuan-Hsiang Han (韓傳祥)
Department of Quantitative Finance, NTHU
Office: R 756 TSMC BLD (台積館)
Phone: 03-5742224
Email: chhan@mx.nthu.edu.tw
URL: http://mx.nthu.edu.tw/~chhan

Class Hours: W7W8W9
Office Hours: 10:00 – 12:00 Tuesday and Wednesday, or by appointment

Prerequisities:
STAT 3875 (basic knowledge of probability and statistics.)
MATH 2030 Advanced Calculus

Textbooks:

1. Steven E. Shreve, "Stochastic Calculus for Finance II: continuous-Time Models," Springer-Verlag, 2003.
2. 韓傳祥, "金融隨機計算," 新陸書局, 2012.

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. Glasserman, Monte Carlo Methods for Financial Engineering, Springer-Verlag, New York, 2003.

Course Contents:

1. Introduction: starting from financial data.

2. Elementary probability and stochastic processes (convergence of integrals; change of measure; conditional expectation.)

3. Brownian motion (random walk; discrete-time models in finance; martingale property; variations; Markov property.)

4. The Black-Scholes model (stochastic calculus; Ito's lemma; market completeness; pricing partial differential equation; hedging strategy; Brownian bridge.)

5. Risk-Neutral pricing (Girsanov's theorem; martingale representation theorem; fundamental theorems of asset pricing.)

6. Conditional Expectation and PDEs (Feynman-Kac Formula)

7. Simulation and algorithms for financial models.

Grading:

Assignments 30%, Exams(midterm and final) 50%, Course Project 20%.