

Title (Units): SCI7580 COMPUTATIONAL FINANCE (2,2,0)

Syllabus Reviewed by: Michael Ng

Prerequisite and Co-requisite: None

Objectives: This subject introduces computational methods for problems of finance, including mainly the computation of market indicators and option price.

Calendar Description: This subject introduces computational methods for problems of finance, including mainly the computation of market indicators and option price.

References:

- 1). The Mathematics of Financial Derivatives, by P. Wilmott, S. Howison & J. Dewynne, Cambridge University Press, 1996.
- 2). Options, Futures and Other Derivatives Securities, by John C. Hull, Prentice-Hall, 3<sup>rd</sup> Ed., 1997.
- 3). Technical Analysis Explained, by M. Pring, McGraw Hill Book Co., 3<sup>rd</sup> Ed., 1991.
- 4). Numerical Analysis, by R.L. Burden, J.D. Faires, 5th edition, PWS-Kent Publishing Company, 1993.

Assessment: Continuous assessment (30%) and Final examination (70%)

Subject Content in Outline:

- I Introduction to Financial Market (6 hours of teaching)
  - A. Corporations, Stocks
  - B. Futures and Options
  - C. Market Indicators
  
- II. The Black-Scholes Model (8 hours of teaching)
  - A. The Black-Scholes Equation
  - B. Solution of the Black-Scholes Equation for European Option
  - C. Variations on the Black-Scholes Model
  - D. American Options
  
- III. Basic Numerical Methods (6 hours of teaching)
  - A. Iteration Methods for Linear Systems
  - B. Finite Difference Method
  - C. Stability and Convergence Analysis
  
- IV. Numerical Methods for Options (8 hours of teaching)
  - A. Finite Difference Method for European Options
  - B. Finite Difference Method for American Options
  - C. Binomial Tree Method
  - D. Monte Carlo Method