Subject Description Form

Subject Code	COMP 5513
Subject Title	Financial Computing
Credit Value	3
Level	5
Pre-requisite/Exclusion	Nil
Objectives	The purpose of this course is to study the basic computational tools of Finance. This includes the study of computational models and quantitative methods. After completing the course, students will have: 1. some fundamental concepts of financial engineering in order to appreciate the need of computational tools for finance; and 2. some appreciation of various computational techniques (e.g. data mining, numerical methods) which have been applied to solve problems in finance (e.g. options, stock prediction, etc.)
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) apply the fundamental concepts of financial engineering; b) be aware of the computational tools for finance; c) make reasonable judgment in choosing computation model to solve problems in finance; d) perform financial simulation and analysis; e) practice presentation and communication skills (through case study presentations); f) be aware of ethical issues in finance; and g) work in a group, presentation and technical writing skills.
Subject Synopsis/ Indicative Syllabus	• **Introduction to Finance**: Internal Rate of Return, Fisher's Effect, Valuation of Assets (e.g., Bonds and Equity), Risk Measurement of Assets, Portfolio Theory (e.g., CAP-M), Derivative, Hedging, Markov Processes, Random Walks, Ito's lemma; Black-Scholes Equations; etc. • **Computational Tools for Finance:** Numerical Methods for PDEs; Finite Difference Methods; Monte Carlo Simulation; Modelling Tools for Financial Options; Stochastic Optimization; etc. • **Computational Intelligence Techniques for Financial Problems:** C Prediction, Forecasting, Classification, Technical Analysis; Neural Networks, Fuzzy Systems, Genetic Algorithms; Financial Data Mining and Information Retrieval; etc. • **Case Studies:** Mean-Variance Efficient Investment Portfolios.
Teaching/Learning Methodology	Formal lectures will be used to present concepts about and mathematical models in financial engineering and introduce various computational techniques to solve computational problems in finance. Students are expected to have background knowledge of

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<tr><td></td><td>probability and statistics, (finite or infinite) series and (partial) differential calculus. Tutorials will be used to discuss, further, techniques and problems encountered in the use of these computational techniques as well as discussing about various case-studies. Seminars will be used for presentation of assignments and discussions, mainly on selected journal articles and conference papers from the developments in computational finance.

39 hours of class activities including - lecture, tutorial, lab, workshop seminar where applicable</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific Assessment Methods/Tasks</td><td rowspan="2">% weighting</td><td colspan="7">Intended subject learning outcomes to be assessed</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td></tr>
<tr><td>Assignments, Tests & Projects</td><td>55</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Final Examination</td><td>45</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td></td><td>✓</td><td></td></tr>
<tr><td>Total</td><td>100</td><td colspan="7"></td></tr>
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<tr><td rowspan="4">Student study effort expected</td><td colspan="2">Class Contact:</td></tr>
<tr><td>Class activities (lecture, tutorial, lab)</td><td>39 hours</td></tr>
<tr><td colspan="2">Other student study effort:</td></tr>
<tr><td>Assignments, Quizzes, Projects, Exams</td><td>65 hours</td></tr>
<tr><td>Total student study effort</td><td>104 hours</td></tr>
<tr><td>Reading list and references</td><td>Books
(1). Bodie, Z., Kane, A., and Marcus, A., 2005, Investment, McGraw-Hill, 6th Edition.
(2). Neftci, Salih, N., 2003, Principles of Financial Engineering, Academic Press.
(3). Levy, G., 2003, Computational Finance: Numerical Methods for Pricing Financial Instruments, Elsevier.
(4). Rudiger Seydel, 2002, Tools for Computational Finance, Springer-Verlag.
(5). Levy, H., Levy, M. and Solomon, S., 2003, Microscopic Simulation of Financial Markets, Academic Press.
Others
IEEE International Conference on Data Mining
Asian Journal of Business and Information System
Journal of Computational Intelligence in Finance
Journal of Computational Finance</td></tr>
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