

## Subject Description Form

<b>Subject Code</b>	COMP 5513
<b>Subject Title</b>	Financial Computing
<b>Credit Value</b>	3
<b>Level</b>	5
<b>Pre-requisite/Exclusion</b>	Nil
<b>Objectives</b>	<p>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:</p> <ol style="list-style-type: none"> <li>1. some fundamental concepts of financial engineering in order to appreciate the need of computational tools for finance;</li> <li>2. some appreciation of various computational techniques (e.g. numerical methods and/or modeling methods) which have been applied to solve problems in finance (e.g. options, stock prediction, etc.)</li> <li>3. practice in the use of tools for financial analysis.</li> </ol>
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>a. apply the fundamental concepts of financial engineering;</li> <li>b. be aware of the computational tools for finance;</li> <li>c. perform financial simulation and analysis and some practice on the use of basic tools;</li> <li>d. practice presentation and communication skills (through case study presentations);</li> <li>e. be aware of ethical issues in finance; and</li> <li>f. work in a group, presentation and technical writing skills.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<ul style="list-style-type: none"> <li>• <b>Introduction to Finance:</b> Internal Rate of Return, Fisher's Effect, Valuation of Assets (e.g., Bonds and Equity), Variable Interest Rate, Risk Measurement of Assets, Portfolio Theory (e.g., CAP-M), Derivative, Hedging,</li> <li>• <b>Computational Methods for Finance:</b> Numerical Methods for PDEs; Finite Difference Methods; Monte Carlo Simulation; Modelling Markov Processes, , Quadratic Programming, Random Walks, Ito's lemma; Black-Scholes Equations; etc.</li> <li>• <b>Introduction of Analysis and Modeling Tools:</b> Financial Options; Stochastic Optimization, time series analysis and/or prediction; etc.</li> <li>• <b>Introduction to New Techniques for Financial Problems:</b> Estimation Methods and/or Financial Data Mining. etc.</li> </ul>
<b>Teaching/Learning Methodology</b>	<p>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 probability and statistics, (finite or infinite) series and (partial) differential calculus. Tutorials and/or labs will be used to discuss, more details of computational techniques learned and the use of some tools to solve problems. Seminars will be used for</p>

	<p>presentation of assignments and discussions, mainly on selected journal articles and conference papers from the developments in computational finance.</p> <p>39 hours of class activities including - lecture, tutorial, lab, workshop seminar where applicable.</p>																																						
<p><b>Assessment Methods in Alignment with Intended Learning Outcomes</b></p>	<table border="1"> <thead> <tr> <th rowspan="2">Specific Assessment Methods/Tasks</th> <th rowspan="2">% weighting</th> <th colspan="6">Intended subject learning outcomes to be assessed</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> <th>e</th> <th>f</th> </tr> </thead> <tbody> <tr> <td>Assignments, Tests &amp; Projects</td> <td>55</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> </tr> <tr> <td>Total</td> <td>100</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Specific Assessment Methods/Tasks	% weighting	Intended subject learning outcomes to be assessed						a	b	c	d	e	f	Assignments, Tests & Projects	55	✓	✓	✓	✓	✓	✓	Final Examination	45	✓	✓	✓				Total	100						
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<p><b>Reading list and references</b></p>	<p><i>Books</i></p> <ol style="list-style-type: none"> <li>Hull, J. (2018) Options, futures, and other derivatives. Pearson Education, Inc.</li> <li>Bodie, Z., Kane, A., and Marcus, A., 2005, Investments, McGraw-Hill, 6th Edition.</li> <li>Kosowski, R.L. and Neftci, S. N., 2015, Principles of Financial Engineering, Academic Press.</li> <li>Levy, G., 2016, Computational Finance using C and C#: derivatives and valuation, Elsevier.</li> <li>Seydel, R.U. 2012, Tools for Computational Finance, Springer London.</li> <li>Levy, H., Levy, M. and Solomon, S., 2003, Microscopic Simulation of Financial Markets, Academic Press.</li> </ol> <p><i>Others</i></p> <p>IEEE International Conference on Data Mining  Asian Journal of Business and Information System  Journal of Computational Intelligence in Finance  Journal of Computational Finance</p>																																						