

Subject Description Form

Subject Code	COMP4146					
Subject Title	Computational Finance					
Credit Value	3					
Level	4					
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: AMA1104 or HKDSE Maths Extended Module or equivalent					
Objectives	<ul style="list-style-type: none"> • To introduce the knowledge of financial models, quantitative methods and computational analysis techniques. • To demonstrate the methodologies for financial simulation and evaluation. 					
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <p><i>Professional/academic knowledge and skills</i></p> <p>(a) understand the fundamental concepts of financial engineering;</p> <p>(b) be aware of the computational tools for finance;</p> <p>(c) make reasonable judgment in choosing suitable computation model to solve problems in finance;</p> <p>(d) perform financial simulation and analysis;</p> <p><i>Attributes for all-roundedness</i></p> <p>(e) develop skills in problem solving using systematic approaches;</p> <p>(f) solve complex problems in groups and develop group work.</p>					
Subject Synopsis/ Indicative Syllabus	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Topic</th> </tr> </thead> <tbody> <tr> <td>1. Introduction to financial options Derivative; foreign exchange; random walks and Markov processes; Ito's lemma; Black-Sholes equations; hedging.</td> </tr> <tr> <td>2. Computational tools for finance Numerical methods for PDEs; finite difference methods; Monte Carlo simulation; modeling tools for financial options.</td> </tr> <tr> <td>3. Computational intelligence techniques for financial problems Prediction; forecasting; classification; technical analysis; artificial intelligence techniques; financial data mining and information retrieval.</td> </tr> </tbody> </table>		Topic	1. Introduction to financial options Derivative; foreign exchange; random walks and Markov processes; Ito's lemma; Black-Sholes equations; hedging.	2. Computational tools for finance Numerical methods for PDEs; finite difference methods; Monte Carlo simulation; modeling tools for financial options.	3. Computational intelligence techniques for financial problems Prediction; forecasting; classification; technical analysis; artificial intelligence techniques; financial data mining and information retrieval.
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	<p>4. Case studies Customer credit risk analysis; foreign exchange forecast, etc.</p>																																															
	<p>Case Study:</p> <p>Seminars are held for students to discuss in-depth real-life cases related to the subject's topics, to give presentations and write reports.</p>																																															
<p>Teaching/Learning Methodology</p>	<p>Teaching is based on lectures in which ethical issues of finance is presented. Lectures include solving technical problems in computational finance. Tutorials are used to provide examples of problems and to show how solutions are developed. There is a project that students need to write their report. This project is typically a group project.</p>																																															
<p>Assessment Methods in Alignment with Intended Learning Outcomes</p>	<table border="1" data-bbox="443 730 1471 1211"> <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 (Please tick as appropriate)</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>1. Assignments, Lab Exercises and Project</td> <td>35%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>2. Mid-term</td> <td>25%</td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>3. Examination</td> <td>40%</td> <td>✓</td> <td></td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td colspan="6"></td> </tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>The project is suitable to assess all the intended learning outcomes as it involves all of them. The mid-term and examination will tests the fundamental concepts learnt by the students as well as to see if the students are capable to perform financial simulation and analysis.</p>		Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c	d	e	f	1. Assignments, Lab Exercises and Project	35%	✓	✓	✓	✓	✓	✓	2. Mid-term	25%	✓		✓	✓			3. Examination	40%	✓		✓	✓			Total	100 %						
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<p>Reading List and References</p>	<p>Reference Books:</p>																																															

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| | <ol style="list-style-type: none">1. Neftci, Salih, N., Principles of Financial Engineering, 2nd Edition, Academic Press, 2008.2. Rudiger Seydel, Tools for Computational Finance, Fourth Edition, Springer-Verlag, 2009.3. Ugur, O. An Introduction to Computational Finance, London, Imperial College Press, 2009.4. Levy, G., Computational Finance: Numerical Methods for Pricing Financial Instruments, Elsevier, 2004.5. Lavy, H., Levy, M. and Solomon, S., Microscopic Simulation of Financial Markets, Academic Press, 2003.6. Articles from magazines, and journal references, including Asian Journal of Business and Information Systems, Journal of Computational Intelligence in Finance, Journal of Computational Finance. |
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