

Subject Description Form

Subject Code	COMP446
Subject Title	Computational Finance
Credit Value	3
Level	4
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite: COMP211 (Nil for 61025) Co-requisite: COMP417 (Nil for 61025) Exclusion: Nil
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> <p>Alignment of Programme Outcomes:</p> <p>Programme Outcome 1: This subject contributes to having students to practice their writing skill with project document and report writing.</p> <p>Programme Outcome 3: This subject contributes to informing students about the ethical issues in (computational) finance.</p> <p>Programme Outcome 4: This subject contributes to developing student critical thinking through tutorials on solving problems. They will practice more in doing their project.</p> <p>Programme Outcome 5: This subject contributes to teaching the technical problem solving ability by examples in lectures, practicing such ability in tutorials</p>

	<p>and measuring such ability by administering quiz or classwork.</p> <p>Programme Outcome 6: This subject contributes to informing students about the advancement of computational finance via lectures or tutorials.</p> <p>Programme Outcome 7: This subject contributes to team work with group-based project for students to practice team spirit.</p>																																														
<p>Subject Synopsis/ Indicative Syllabus</p>	<table border="1" data-bbox="467 359 1398 930"> <thead> <tr> <th data-bbox="467 359 1398 394" style="text-align: center;">Topic</th> </tr> </thead> <tbody> <tr> <td data-bbox="467 394 1398 537"> <p>1. Introduction to financial options Derivative; foreign exchange; random walks and Markov processes; Ito's lemma; Black-Sholes equations; hedging.</p> </td> </tr> <tr> <td data-bbox="467 537 1398 680"> <p>2. Computational tools for finance Numerical methods for PDEs; finite difference methods; Monte Carlo simulation; modeling tools for financial options.</p> </td> </tr> <tr> <td data-bbox="467 680 1398 823"> <p>3. Computational intelligence techniques for financial problems Prediction; forecasting; classification; technical analysis; artificial intelligence techniques; financial data mining and information retrieval.</p> </td> </tr> <tr> <td data-bbox="467 823 1398 930"> <p>4. Case studies Customer credit risk analysis; foreign exchange forecast, etc.</p> </td> </tr> </tbody> </table> <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>	Topic	<p>1. Introduction to financial options Derivative; foreign exchange; random walks and Markov processes; Ito's lemma; Black-Sholes equations; hedging.</p>	<p>2. Computational tools for finance Numerical methods for PDEs; finite difference methods; Monte Carlo simulation; modeling tools for financial options.</p>	<p>3. Computational intelligence techniques for financial problems Prediction; forecasting; classification; technical analysis; artificial intelligence techniques; financial data mining and information retrieval.</p>	<p>4. Case studies Customer credit risk analysis; foreign exchange forecast, etc.</p>																																									
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<p>Teaching/Learning Methodology</p>	<p>Teaching is based on lectures in which ethical issues of finance is presented (aligned to Programme Outcome 3). Lectures include solving technical problems in computational finance (aligned to Programme Outcomes 5, 6). Tutorials are used to provide examples of problems and to show how solutions are developed (aligned to Programme Outcomes 4, 5). There is a project that students need to write their report (aligned to Programme Outcomes 1,4). This project is typically a group project (aligned to Programme Outcome 7).</p>																																														
<p>Assessment Methods in Alignment with Intended Learning Outcomes</p>	<table border="1" data-bbox="459 1476 1414 1927"> <thead> <tr> <th data-bbox="459 1476 764 1633" rowspan="2">Specific assessment methods/tasks</th> <th data-bbox="764 1476 911 1633" rowspan="2">% weighting</th> <th colspan="6" data-bbox="911 1476 1414 1570">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th data-bbox="911 1570 992 1633">a</th> <th data-bbox="992 1570 1073 1633">b</th> <th data-bbox="1073 1570 1154 1633">c</th> <th data-bbox="1154 1570 1235 1633">d</th> <th data-bbox="1235 1570 1317 1633">e</th> <th data-bbox="1317 1570 1414 1633">f</th> </tr> </thead> <tbody> <tr> <td data-bbox="459 1633 764 1728">1. Assignments, Project & Lab exercises</td> <td data-bbox="764 1633 911 1728">35%</td> <td data-bbox="911 1633 992 1728">✓</td> <td data-bbox="992 1633 1073 1728">✓</td> <td data-bbox="1073 1633 1154 1728">✓</td> <td data-bbox="1154 1633 1235 1728">✓</td> <td data-bbox="1235 1633 1317 1728">✓</td> <td data-bbox="1317 1633 1414 1728">✓</td> </tr> <tr> <td data-bbox="459 1728 764 1791">2. Mid-term</td> <td data-bbox="764 1728 911 1791">25%</td> <td data-bbox="911 1728 992 1791">✓</td> <td data-bbox="992 1728 1073 1791"></td> <td data-bbox="1073 1728 1154 1791"></td> <td data-bbox="1154 1728 1235 1791">✓</td> <td data-bbox="1235 1728 1317 1791"></td> <td data-bbox="1317 1728 1414 1791"></td> </tr> <tr> <td data-bbox="459 1791 764 1854">3. Examination</td> <td data-bbox="764 1791 911 1854">40%</td> <td data-bbox="911 1791 992 1854">✓</td> <td data-bbox="992 1791 1073 1854"></td> <td data-bbox="1073 1791 1154 1854"></td> <td data-bbox="1154 1791 1235 1854">✓</td> <td data-bbox="1235 1791 1317 1854"></td> <td data-bbox="1317 1791 1414 1854"></td> </tr> <tr> <td data-bbox="459 1854 764 1927">Total</td> <td data-bbox="764 1854 911 1927">100 %</td> <td data-bbox="911 1854 992 1927"></td> <td data-bbox="992 1854 1073 1927"></td> <td data-bbox="1073 1854 1154 1927"></td> <td data-bbox="1154 1854 1235 1927"></td> <td data-bbox="1235 1854 1317 1927"></td> <td data-bbox="1317 1854 1414 1927"></td> </tr> </tbody> </table>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						a	b	c	d	e	f	1. Assignments, Project & Lab exercises	35%	✓	✓	✓	✓	✓	✓	2. Mid-term	25%	✓			✓			3. Examination	40%	✓			✓			Total	100 %						
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	<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>	
Student Study Effort Expected	Class contact:	
	▪ Lecture	39 Hrs.
	▪ Tutorial/Seminar	0 Hrs.
	Other student study effort:	
	▪ Project & Self Study	66 Hrs.
	Total student study effort	105 Hrs.
Reading List and References	<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Neftci, Salih, N., Principles of Financial Engineering, Academic Press, 2003. 2. Levy, G., Computational Finance: Numerical Methods for Pricing Financial Instruments, Elsevier, 2003. 3. Los, C.A., Computational Finance: A Scientific Perspective, World Science Publishing, 2001. 4. Rudiger Seydel, Tools for Computational Finance, Springer-Verlag, 2002. 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. 	