

Subject Description Form

Subject Code	AMA4325
Subject Title	Derivative Pricing
Credit Value	3
Level	4
Pre-requisite	Introduction to Differential Equations (AMA2008) or Mathematics II (AMA2112) or Advanced Calculus and Linear Algebra (AMA2703) or equivalent and Applied Probability Models for Investment (AMA358) or Stochastic Processes for Investment (AMA3658)
Exclusion	Mathematics for Financial Derivatives (AMA435)
Objectives	This subject is to teach students the basic theory and mathematical techniques for pricing financial options and other derivative securities.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students should be able to: a. apply no-arbitrage principle to investigate real-life market discrepancies; b. solve elementary stochastic differential equations; c. apply the theory of options to consider the pricing of financial derivatives; d. synthesize the knowledge and techniques required in solving real-life problems.
Subject Synopsis/ Indicative Syllabus	<i>Introduction to Options and Derivatives</i> Options, forwards, futures, and other derivative securities. (5 hours) Principle of no arbitrage, self-financing strategies, fundamental theorem of asset pricing, risk-neutral valuation, martingale. (8 hours) Properties of stock option prices, put-call parity. (4 hours) <i>Basic Options Theory</i> Option pricing in discrete time: binomial lattice and the Cox-Ross-Rubinstein model. (6 hours) Option pricing in continuous time: geometric Brownian motion and the Black-Scholes formula. (5 hours) Elementary stochastic calculus, Ito's lemma. (8 hours) Parameters for the pricing and hedging of options: delta, theta, gamma, vega, rho. (3 hours)
Teaching/Learning	The subject will be delivered mainly through lectures and tutorials. The lectures

Methodology	will be conducted to introduce the mathematical concepts for financial derivatives in the syllabus, which are then reinforced by learning activities involving demonstration, tutorial exercise and assignments.																																															
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" data-bbox="472 349 1433 678"> <thead> <tr> <th rowspan="2">Specific assessment methods</th> <th rowspan="2">% weighting</th> <th colspan="4">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> </tr> </thead> <tbody> <tr> <td>1. Assignments</td> <td>20%</td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td>2. Tests</td> <td>20%</td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td>3. Examination</td> <td>60%</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> </tr> </tbody> </table> <p data-bbox="472 712 1439 1037">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on knowledge, skill and understanding of Derivative Pricing, thus, Exam-based assessment is the most appropriate assessment method, including 20% test and 60% examination. Moreover, 20% worth of assignments are included as a component of continuous assessment so as to keep the students in progress. Continuous Assessment comprises of assignments and tests. A written examination is held at the end of the semester.</p>						Specific assessment methods	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				a	b	c	d	1. Assignments	20%	✓	✓		✓	2. Tests	20%	✓	✓		✓	3. Examination	60%	✓	✓	✓	✓	Total	100 %												
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Reading List and References	<p data-bbox="472 1525 1439 1641"><u>Textbook:</u> Hull, J.C. Options, Futures, and Other Derivatives Pearson 2017 10th edition</p> <p data-bbox="472 1659 1439 1928"><u>References:</u> Etheridge, A. A Course in Financial Calculus Cambridge University Press 2002 LeRoy, S.F., Werner, J. & Ross, S.A. Principles of Financial Economics 1st edition Cambridge University Press 2000 Luenberger, D.G Investment Science 2nd edition Oxford University Press 1998</p>																																															

	Panjer, H.H. <i>et al</i>	Financial Economics: With Applications to Investments, Insurance and Pensions	Society of Actuaries 1998
	McDonald, R.L.	Derivative Markets 3 rd edition (Chapters 10-14, 20-24)	Addison Wesley 2009