

Subject Description Form

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| Subject Code | AMA4325 |
| Subject Title | Derivative Pricing |
| Credit Value | 3 |
| Level | 4 |
| Pre-requisite | Introduction to Differential Equations (AMA2008) or Mathematics II (AMA2112) or Further Mathematical Methods for Finance (AMA3723) or Further Mathematical Methods (AMA3724) or equivalent and Probability and Distributions (AMA2691) or Stochastic Processes for Investment (AMA3658) [Students are encouraged to enroll AMA3658 prior to AMA4325] |
| 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) |

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| | Parameters for the pricing and hedging of options: delta, theta, gamma, vega, rho. (3 hours) | | | | | |
| Teaching/Learning Methodology | The subject will be delivered mainly through lectures and tutorials. The lectures 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 | 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 % | | | | | |
| | <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>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.</p> <p>Continuous Assessment comprises of assignments and tests. A written examination is held at the end of the semester.</p> | | | | | |
| Student Study Effort Expected | Class contact: | | | | | |
| | Lecture | | 26 Hrs. | | | |
| | Tutorial | | 13 Hrs. | | | |
| | Other student study effort: | | | | | |
| | Assignment | | 40 Hrs. | | | |
| | Self-study | | 30 Hrs. | | | |
| | Total student study effort | | 109 Hrs. | | | |
| Reading List and References | <u>Textbook:</u> | | | | | |
| | Hull, J.C. | Options, Futures, and Other Derivatives | Pearson | 2017 | | |
| | | 10 th edition | | | | |
| | <u>References:</u> | | | | | |
| Etheridge, A. | A Course in Financial Calculus | Cambridge | University Press | | | |
| | | 2002 | | | | |

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| | LeRoy, S.F., Werner, J. & Ross, S.A. | Principles of Financial Economics 1 st edition | Cambridge University Press 2000 |
| | Luenberger, D.G | Investment Science 2 nd edition | Oxford University Press 1998 |
| | 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 |