Subject Description Form

<table>
<tr><td>Subject Code</td><td>AMA435</td></tr>
<tr><td>Subject Title</td><td>Mathematics for Financial Derivatives</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>4</td></tr>
<tr><td>Pre-requisite/
Co-requisite/
Exclusion</td><td>Advanced Mathematical Methods for Economics and Finance (AMA273) or
Introduction to Differential Equations (AMA2008) or
Mathematics II (AMA2112)
and
Applied Probability Models for Investment (AMA358)</td></tr>
<tr><td>Objectives</td><td>This subject is to teach students the basic theory and mathematical techniques for pricing financial options and other derivative securities.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>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.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Introduction to Options and Derivatives
Options, forwards, futures, and other derivative securities. (5 hours)
Principle of no arbitrage, self-financing strategies, fundamental theorem of asset pricing, risk-neutral valuation. (5 hours)
Properties of stock option prices, relationship between put and call options. (4 hours)

Basic Options Theory
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)
Delta hedging, theta, gamma, vega, rho. (6 hours)</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>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.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Assignments</td><td>20%</td><td>✓</td><td>✓</td><td></td><td>✓</td></tr>
</table>
</td></tr>
</table>

	2. Tests	20%	✓	✓		✓
	3. Examination	60%	✓	✓	✓	✓
	Total	100 %				

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
The subject focuses on knowledge, skill and understanding of **Mathematics for Financial Derivatives**, 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.

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

Textbook:

Hull, J.C.	Options, Futures, and Other Derivatives 8th edition	Prentice Hall 2011

References:

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	Oxford University Press 1997
Panjer, H.H. *et al*	Financial Economics: With Applications to Investments, Insurance and Pensions	Society of Actuaries 1998
McDonald, R.L.	Derivative Markets 3rd edition (Chapters 10-14, 20-24)	Addison Wesley 2009