

Subject Description Form

Subject Code	AMA2703
Subject Title	Mathematical Methods for Finance
Credit Value	3
Level	2
Pre-requisite	Basic Statistics (AMA1006) or equivalent and Calculus and Linear Algebra I (AMA1007) or equivalent
Exclusion	Advanced Mathematical Methods for Economics and Finance (AMA273) Probability and Distributions for Risk Management (AMA3721)
Objectives	This subject is to introduce students to the ideas and techniques of multivariable calculus, bivariate distributions and their applications.
Intended Learning Outcomes	Upon satisfactory completion of the subject, students should be able to: <ul style="list-style-type: none"> a. apply the differentiability of multivariable functions to compute derivatives using various rules of differentiation; apply differential calculus to calculate rates of change, locate local extrema; apply the idea of Lagrange multiplier to constrained optimization problems; b. develop the concept of multiple integral of a function of several variables over a plane or space domain and evaluate multiple integrals; c. apply the techniques of multivariable calculus and bivariate distributions to problems in finance analytics.
Subject Synopsis/ Indicative Syllabus	<p><i>Differential Calculus for functions of several variables: (15 hours)</i> Partial derivatives; chain rule in several variables; Taylor's formula, relative extrema; Lagrange multipliers, applications.</p> <p><i>Multiple Integrals: (12 hours)</i> Double and triple integrals; the change of variables formula.</p> <p><i>Bivariate distributions: (12 hours)</i> Review on probability theory, random variable and distributions; moment generating function, transformation of random variable, mixed type distribution, joint, marginal and conditional distributions, conditional expectation, covariance, function of two random variables, order statistics, applications in finance analytics.</p>
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures will be conducted to provide the students with an integrated knowledge required for the understanding of the basic mathematical concepts and techniques. To develop students' ability for logical thinking, effective communication and ability to apply the theory they learn in lectures, tutorial and presentation sessions will be held.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
			a	b	c
	1. Assignments / Quizzes	15%	✓	✓	✓
	2. Tests	25%	✓	✓	
	3. Examination	60%	✓	✓	✓
Total	100 %				
<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on knowledge, skill and understanding of Multivariable Calculus and Bivariate Distributions, thus, Exam-based assessment is the most appropriate assessment method, including 25% tests and 60% examination. Moreover, 15% worth of assignments and quizzes are included as a component of continuous assessment so as to keep the students in progress. Continuous Assessment comprises of assignments and/or quizzes, 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 Other student study effort:				
	• Self Study		33 Hrs.		
	• Assignments		33 Hrs.		
	Total student study effort		105 Hrs.		
Reading List and References	<u>Textbooks:</u>				
	Stewart, J.	Calculus, 8 th edition	Cengage Learning, 2016		
	Bean, M.A.	Probability: The Science of Uncertainty with Applications to Investments, Insurance, and Engineering Chapter. 1 - 9	Brooks Cole, 2001		
	<u>References:</u>				
	Thomas, G.B., Weir, M.D. & Hass, J.R.	Thomas' Calculus, 14 th edition	Pearson, 2018		
Hogg, R.V., McKean, J.W. & Craig, A.T.	Introduction to Mathematical Statistics 7 th edition	Pearson, 2013			

