

Subject Description Form

Subject Code	AMA273
Subject Title	Advanced Mathematical Methods for Economics and Finance
Credit Value	3
Level	2
Pre-requisite	Calculus (AMA1007) or Advanced Calculus and Linear Algebra (AMA2701/AMA2701A) or equivalent
Objectives	This subject is for students to learn multivariable calculus and the fundamental techniques for solving certain classes of first and second order linear ordinary and partial differential equations, and their applications to modeling and solving problems in economics and finance.
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. use differential equations to model basic problems in economics and finance, and know how to solve certain classes of first and second order linear ordinary and partial differential equations.
Subject Synopsis/ Indicative Syllabus	<p><i>Differential Calculus for functions of several variables: (11 hours)</i> Partial derivatives; total differential; chain rule; Taylor's Formula; relative extrema; Lagrange multipliers; nonlinear constrained optimization.</p> <p><i>Multiple Integrals: (6 hours)</i> Double and triple integrals; the change of variables formula.</p> <p><i>Ordinary Differential Equations: (8 hours)</i> Exact equations; Variation of parameters; Laplace Transform.</p> <p><i>Partial Differential Equations: (9 hours)</i> Classification of PDE; Separation of variables; Solution of initial and boundary value problems for standard PDE; Series of solutions (Fourier Series)</p> <p><i>Applications: (5 hours)</i> Market price dynamics; Solow growth model; Black-Scholes equation; Term structure of interest rates.</p>
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures will be conducted to introduce the concepts of advanced mathematical methods for

	economics and finance 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
	1. Assignments/Quizzes	10%	✓	✓	✓
	2. Tests	30%	✓		
	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 <u>Advanced Mathematical Methods for Economics and Finance</u>, thus, <u>Exam-based assessment</u> is the most appropriate assessment method, including 30% test and 60% examination. Moreover, 10% 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 effort:				
	▪ Assignment		16 Hrs.		
	▪ Self-study		50 Hrs.		
	Total student study effort		105 Hrs.		
Reading List and References	<u>Textbooks:</u>				
	Chan, C.K., Chan, C.W. & Hung, K.F.	Basic Engineering Mathematics 3 rd edition	McGraw-Hill 2011		
	Martin Anthony & Norman Biggs	Mathematics for Economics and Finance: Methods and Modelling		New York: Cambridge University Press 1996	
	<u>References:</u>				
	Thomas, G.B., Weir, M.D. & Hass, J.R.	Thomas' Calculus 12 th edition	Addison Wesley 2009		
	Kaplan, W.	Advanced Calculus 5 th edition	Addison Wesley 2002		
	Chiang, A.C. & Wainwright, K.	Fundamental Methods of Mathematical Economics 4 th edition	McGraw-Hill 2005		

	Boyce, W.E.	Elementary Differential Equations 9 th edition	Wiley 2008
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