

## Subject Description Form

<b>Subject Code</b>	AMA2701
<b>Subject Title</b>	Advanced Calculus and Linear Algebra
<b>Credit Value</b>	3
<b>Level</b>	2
<b>Pre-requisite</b>	Calculus and Linear Algebra I (AMA1007) or equivalent
<b>Exclusion</b>	Advanced Calculus and Linear Algebra (AMA2701A)
<b>Objectives</b>	This subject is to introduce students to the ideas and techniques of differential equations, linear algebra and their applications.
<b>Intended Learning Outcomes</b>	Upon satisfactory completion of the subject, students should be able to: <ul style="list-style-type: none"> <li>a. Solve simple differential equations of first and second order.</li> <li>b. perform basic operations of matrix algebra and apply them to solve system of linear equations;</li> <li>c. discuss the basic concepts of vector spaces, linear transformations and inner product spaces with geometric interpretation;</li> <li>d. apply the techniques of linear algebra to problems in statistics and applied mathematics.</li> </ul>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><i>Differential equations (9 hours)</i> Simple first order differential equations, second order linear differential equations with constant coefficients, applications.</p> <p><i>Vector spaces (8 hours)</i> Vector space axioms, subspace, spanning sets, linear dependence and independence, bases and dimension.</p> <p><i>Linear transformations (11 hours)</i> Definition of linear transformation, kernel and range, the matrix of a linear transformation, change of basis, eigenvalues and eigenvectors.</p> <p><i>Inner product spaces (11 hours)</i> Inner product, norm, orthogonality, Gram-Schmidt orthogonalization process, diagonalization of symmetric matrices.</p>
<b>Teaching/Learning Methodology</b>	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.

<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
			a	b	c	d
	1. Assignments / Quizzes	16%	✓	✓	✓	✓
	2. Tests	24%	✓	✓		✓
	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 <b>Advanced Calculus and Linear Algebra</b>, thus, <b>Exam-based assessment</b> is the most appropriate assessment method, including 24% test and 60% examination. Moreover, 16% 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>						
<b>Student Study Effort Expected</b>	Class contact:					
	Lecture		26 Hrs.			
	Tutorial		13 Hrs.			
	Other student study effort:					
	Assignment		33 Hrs.			
	Self-study		33 Hrs.			
	Total student study effort		105 Hrs.			
<b>Reading List and References</b>	<u>Textbooks:</u>					
	Anton, H.	Elementary Linear Algebra 10 <sup>th</sup> edition	John Wiley & Sons	2010		
	Hung, K.F. & Pong, G.T.Y.	Foundation Mathematics Revised edition	McGraw Hill	2008		
	<u>References:</u>					
	Kolman, B. & Hill, D.R.	Elementary Linear Algebra with applications 9 <sup>th</sup> edition	Prentice Hall	2007		
	Lay, D.C.	Linear Algebra with Applications 4 <sup>th</sup> edition	Addison Wesley	2011		
	Apostol, T.M.	Linear Algebra: A First Course with Applications to Differential Equations 1 <sup>st</sup> edition	Wiley-Interscience	1997		
	Strang, G.	Linear Algebra with its Applications 4 <sup>th</sup> edition	Brooks Cole	2005		

