

## Subject Description Form

<b>Subject Code</b>	AMA2882
<b>Subject Title</b>	Mathematics for Scientists and Engineers
<b>Credit Value</b>	4
<b>Level</b>	2
<b>Pre-requisite/</b>	Calculus and Linear Algebra (AMA1007)
<b>Co-requisite/ Exclusion</b>	<b>Exclusion:</b> Intermediate Calculus and Linear Algebra (AMA2007), Mathematics I (AMA2111)
<b>Objectives</b>	The subject aims to provide students with some necessary and essential mathematical techniques in science. The emphasis will be on application of mathematical methods to solving problems in physical phenomenon.
<b>Intended Learning Outcomes</b>	Upon completion of the subject, students will be able to: <ol style="list-style-type: none"> <li>1. apply mathematical reasoning to analyze essential features of different problems;</li> <li>2. extend their knowledge of mathematical techniques and adapt known solutions to different situations in physical science;</li> <li>3. apply appropriate mathematical techniques to model and solve problems;</li> <li>4. search for useful information in solving problems.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><i>Linear Algebra:</i> Matrices and determinants; System of linear equations; Vector spaces and linear dependence; Eigenvalues and eigenvectors, diagonalization and orthogonality.</p> <p><i>Partial Differentiation:</i> Introduction to partial differentiation; Total differentials; Chain rule with two independent variables and implicit partial differentiation; Maxima and minima.</p> <p><i>Calculus and Vector:</i> Complex numbers; De Moivre's formula; Convergence of infinite series; Power series; Taylor series; Vectors, scalar and vector products; Multiple integrals.</p> <p><i>Ordinary Differential Equations (ODE):</i> First order ODE; Second order linear ODE with constant coefficients.</p>
<b>Teaching/Learning Methodology</b>	The subject aims to provide students with an integrated knowledge required for understanding the mathematical concepts, reasoning and techniques, and their applications. Tutorials will further enhance students' understanding and develop their problem-solving abilities. In addition, online interactive materials are available in the Blackboard platform so that blended learning is achieved. Problems randomly selected from a database by the computer in the form of quiz will be given to reinforce their learning. Hands-on trial and testing on selected topics using the computer are available.

<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)			
			1	2	3	4
	a. Continuous Assessment	40%	✓	✓	✓	✓
	b. Examination	60%	✓		✓	
	Total	100 %				
Tutorial exercises, assignments and relevant problems will be given to students. These will be assessed and returned to the students. Solutions or suggested answers will be posted afterwards.						
<b>Student Study Effort Required</b>	Class contact:					
	▪ Lecture					39 Hrs.
	▪ Tutorial and Student Presentation					13 Hrs.
	Other student study effort:					
	▪ Assignments					28 Hrs.
	▪ Self-study					56 Hrs.
	Total student study effort					136 Hrs.
<b>Reading List and References</b>	<u>Textbook:</u>					
	Chan, C.K., Chan, C.W. & Hung, K.F.	Basic Engineering Mathematics	McGraw-Hill 2015			
	<u>References:</u>					
	Anton, H.	Elementary Linear Algebra 11 <sup>th</sup> edition	Wiley 2014			
	Thomas, G.B., Weir, M.D. & Hass, J.R.	Thomas' Calculus 14 <sup>th</sup> edition	Pearson Education 2017			
Kreyszig, E.	Advanced Engineering Mathematics 10 <sup>th</sup> edition	Wiley 2011				