

Subject Description Form

Subject Code	AMA2111
Subject Title	Mathematics I
Credit Value	3
Level	2
Pre-requisite	Calculus and Linear Algebra (AMA1007) or Basic Mathematics II – Calculus and Linear Algebra (AMA1120) or Calculus for Engineers (AMA1130) or Calculus (AMA1131) or Foundation Mathematics for Accounting and Finance (AMA1500)
Exclusion	Intermediate Calculus and Linear Algebra (AMA2007/AMA2707) Mathematics for Engineers (AMA2131/AMA2308) Engineering Mathematics (AMA2380) Applied Mathematics I (AMA2511) Mathematics for Scientists and Engineers (AMA2882) Engineering Mathematics (AMA290)
Objectives	This subject aims to introduce students to the basic principles and techniques of engineering mathematics. Emphasis will be on the understanding of fundamental concepts as well as applications of mathematical methods in solving practical problems in science and engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: <ol style="list-style-type: none"> 1. apply mathematical reasoning to analyze essential features of different problems in science and engineering; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; 3. develop and extrapolate the mathematical concepts in synthesizing and solving new problems 4. demonstrate abilities of logical and analytical thinking; 5. search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	<ol style="list-style-type: none"> 1. <u>Algebra of complex numbers</u> Complex numbers, geometric representation, complex exponential functions, n-th roots of a complex number. 2. <u>Linear algebra</u>

	<p>Systems of linear equations, vector spaces, inner product and orthogonality, eigenvalues and eigenvectors, applications.</p> <p>3. <u>Ordinary differential equations</u></p> <p>ODE of first and second order, linear systems, Laplace transforms, Convolution theorem, applications to mechanical vibrations and simple circuits.</p> <p>4. <u>Differential calculus of functions of several variables</u></p> <p>Partial derivatives, total differential, chain rule, Taylor's expansion, maxima and minima, directional derivatives, Lagrange multipliers, implicit differentiation, applications.</p>																																	
<p>Teaching/Learning Methodology</p>	<p>The subject will be delivered mainly through lectures and tutorials. The lectures aim to provide the students with an integrated knowledge required for the understanding and application of mathematical concepts and techniques. Tutorials will mainly be used to develop students' problem solving ability.</p>																																	
<p>Assessment Methods in Alignment with Intended Learning Outcomes</p>	<table border="1" data-bbox="485 909 1436 1335"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="5">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>1.Homework, quizzes and mid-term test</td> <td>40%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>2. Examination</td> <td>60%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>Total</td> <td>100%</td> <td colspan="5"></td> </tr> </tbody> </table> <p>Continuous Assessment comprises of assignments, in-class quizzes, online quizzes and a mid-term test. An examination is held at the end of the semester.</p> <p>Questions used in assignments, quizzes, tests and examinations are used to assess students' level of understanding of the basic concepts and their ability to use mathematical techniques in solving problems in science and engineering.</p> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p><i>The subject focuses on understanding of basic concepts and application of techniques in engineering mathematics. As such, an assessment method based mainly on examinations/tests/quizzes is considered appropriate. Furthermore, students are required to submit homework assignments regularly in order to allow subject lecturers to keep track of students' progress in the course.</i></p>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)					1	2	3	4	5	1.Homework, quizzes and mid-term test	40%	✓	✓	✓	✓	✓	2. Examination	60%	✓	✓	✓	✓	✓	Total	100%					
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	<p>Class contact:</p> <ul style="list-style-type: none"> • Lecture 																																	
	<p>26 Hours</p>																																	

Student Study Effort Expected	• Tutorial	13 Hours
	• Mid-term test and examination	
	Other student study effort	
	• Assignments and Self study	78 Hours
	Total student study effort:	117 Hours
Reading List and References	<ol style="list-style-type: none"> 1. C.K. Chan, C.W. Chan and K.F. Hung, <i>Basic Engineering Mathematics</i>, McGraw-Hill, 2015. 2. Anton, H. <i>Elementary Linear Algebra</i> (11th edition). Wiley, 2014. 3. Kreyszig, E. (2011). <i>Advanced Engineering Mathematics</i>, 10th ed. Wiley. 4. James, G. (2015). <i>Modern Engineering Mathematics</i>, 5th ed. Pearson Education Limited 5. Thomas, G. B., Weir, M. D. & Hass, J. R. <i>Thomas' Calculus</i>, 14th ed. Pearson Education 2017 	