

Subject Description Form

Subject Code	AMA2380
Subject Title	Engineering Mathematics
Credit Value	3
Level	2
Pre-requisite/	Calculus I (AMA1101) or Calculus IA (AMA1102) or Basic Mathematics II –Calculus and Linear algebra (AMA1120) or Calculus for Engineers (AMA1130)
Co-requisite/ Exclusion	Exclusion: Intermediate Calculus and Linear Algebra (AMA2007), Mathematics I (AMA2111)
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: (a) apply mathematical reasoning to analyze essential features of different problems in science and engineering; (b) extend their knowledge of mathematical and numerical techniques and adapt known solutions in various situations; (c) develop and extrapolate the mathematical concepts in synthesizing and solving new problems (d) demonstrate abilities of logical and analytical thinking; (e) search for useful information in the process of problem solving.
Subject Synopsis/ Indicative Syllabus	<i>Infinite and Fourier series</i> Sequences and series; Test of convergence; Maclaurin and Taylor expansions. Fourier series of a periodic function; Half range expansion. <i>Ordinary differential equations</i> ODE of first and second order; linear equations; simple harmonic oscillations; damped and forced vibrations. Systems of linear ODE. <i>Laplace Transform</i> Laplace transforms, Convolution theorem, applications to mechanical vibrations and simple circuits. <i>Differential calculus of functions of several variables</i> Partial derivatives, total differential, chain rule, Taylor's expansion, maxima and minima, directional derivatives, Lagrange multipliers, implicit differentiation, applications.

Teaching/Learning Methodology	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.																																					
Assessment Methods in Alignment with Intended Learning Outcomes	<table border="1" data-bbox="506 394 1404 823"> <thead> <tr> <th data-bbox="506 394 792 571" rowspan="2">Specific assessment methods/tasks</th> <th data-bbox="792 394 946 571" rowspan="2">% weighting</th> <th colspan="5" data-bbox="946 394 1404 514">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th data-bbox="946 514 1039 571">a</th> <th data-bbox="1039 514 1128 571">b</th> <th data-bbox="1128 514 1218 571">c</th> <th data-bbox="1218 514 1307 571">d</th> <th data-bbox="1307 514 1404 571">e</th> </tr> </thead> <tbody> <tr> <td data-bbox="506 571 792 697">1. Homework, quizzes and mid-term test</td> <td data-bbox="792 571 946 697">40%</td> <td data-bbox="946 571 1039 697">✓</td> <td data-bbox="1039 571 1128 697">✓</td> <td data-bbox="1128 571 1218 697">✓</td> <td data-bbox="1218 571 1307 697">✓</td> <td data-bbox="1307 571 1404 697">✓</td> </tr> <tr> <td data-bbox="506 697 792 751">2. Examination</td> <td data-bbox="792 697 946 751">60%</td> <td data-bbox="946 697 1039 751">✓</td> <td data-bbox="1039 697 1128 751">✓</td> <td data-bbox="1128 697 1218 751">✓</td> <td data-bbox="1218 697 1307 751">✓</td> <td data-bbox="1307 697 1404 751">✓</td> </tr> <tr> <td data-bbox="506 751 792 823">Total</td> <td data-bbox="792 751 946 823">100 %</td> <td colspan="5" data-bbox="946 751 1404 823"></td> </tr> </tbody> </table> <p data-bbox="506 856 1404 924">Continuous Assessment comprises of assignments, quizzes, and a mid-term test. An examination is held at the end of the semester.</p> <p data-bbox="506 940 1404 1039">Questions used in assignments, 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 data-bbox="506 1056 1404 1123">Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p data-bbox="506 1140 1404 1339"><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)					a	b	c	d	e	1. Homework, quizzes and mid-term test	40%	✓	✓	✓	✓	✓	2. Examination	60%	✓	✓	✓	✓	✓	Total	100 %					
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Student Study Effort Expected	Class contact:																																					
	• Lecture	26 Hours																																				
	• Tutorial	13 Hours																																				
	Other student study effort																																					
	• Assignments and Self study	78 Hours																																				
	Total student study effort		117 Hours																																			

Reading List and References	CHAN, C.K., CHAN, C.W., HUNG, K.F.	Basic Engineering Mathematics 4th edition	McGraw-Hill, 2015
	ANTON, H.	Elementary Linear Algebra	Wiley 2014
	KREYSZIG, E.	Advanced Engineering Mathematics	Wiley 2011
	JAMES, G.	Modern Engineering Mathematics	Pearson 2015
	THOMAS, G.B., WEIR, M.D., HASS, Joel, GIORDANO, F.R.	Thomas' Calculus	Addison Wesley 2005