

Subject Description Form

Subject Code	AMA2891
Subject Title	Mathematics for Scientists and Engineers II
Credit Value	3
Level	2
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	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.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> 1. apply mathematical reasoning to analyze essential features of different problems; 2. extend their knowledge of mathematical techniques and adapt known solutions to different situations in physical science; 3. apply appropriate mathematical techniques to model and solve problems; 4. search for useful information in solving problems.
Subject Synopsis/ Indicative Syllabus	<p><i>Ordinary Differential Equations (ODE):</i> First order ODE; Second order linear ODE with constant coefficients; Inhomogeneous equations.</p> <p><i>Infinite Series:</i> Convergence of infinite series; Power series; Taylor series; Fourier series.</p> <p><i>Partial Differential Equations (PDE):</i> Modelling by PDE; Initial and boundary value problems; Classification of PDE; Method of characteristic lines; Method of separation of variables.</p> <p><i>Integral Transform Methods:</i> Complex numbers; De Moivre's formula; Functions of a complex variable; Laplace transform; Convolution theorem; Fourier transform; Applications.</p>
Teaching/Learning Methodology	This subject will be delivered mainly through lectures and tutorials. MATLAB software package may also be used for demonstrating some materials such as power and Fourier series. The lectures aim to provide students with an integrated knowledge required for understanding the mathematical concepts, reasoning and techniques, and their applications. Some concepts and techniques such as progressive approximations of a function by a power or Fourier series may also be demonstrated using MATLAB codes. Tutorials are used to enhance students' understanding and develop their problem-solving abilities.

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
			1	2	3	4
	a. Two class tests and the mid-term test	40%	✓	✓	✓	✓
	b. Final examination	60%	✓	✓	✓	✓
	Total	100 %				
<p>Questions in the class tests, mid-term test and final examination will be designed to assess students' abilities to apply mathematical concepts and techniques taught in the subject to various problems in physics and engineering and to search for useful information in problem-solving.</p> <p>To pass this subject, students are required to obtain Grade D or above in both the Continuous Assessment and the Examination components.</p>						
Student Study Effort Required	Class contact:					
	▪ Lecture		28 Hrs.			
	▪ Tutorial and Student Presentation		14 Hrs.			
	Other student study effort:					
	▪ Non-assessable assignments		28 Hrs.			
	▪ Self-study		42 Hrs.			
	Total student study effort		112 Hrs.			
Reading List and References	<u>Textbook:</u>					
	Chan, C.K., Chan, C.W. & Hung, K.F.	Basic Engineering Mathematics Updated 3 rd edition	McGraw Hill 2011			
	<u>References:</u>					
	Thomas, G.B., Weir, M.D. & Hass, J.R.	Thomas' Calculus 12 th edition	Addison Wesley 2009			
Logan, J.D.	A First Course in Differential Equations 1 st edition	Springer 2005				