Subject Description Form

Subject Code	AMA3811
Subject Title	Mathematics II
Credit Value	3
Level	3
Pre-requisite / Co-requisite/ Exclusion	Pre-requisite : Mathematics I (AMA280)
Objectives	The subject aims to introduce students to some fundamental knowledge in mathematical topics including vector calculus, linear programming and numerical analysis. The emphasis will be on application of mathematical and numerical methods to solving problems in building services engineering.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: 1. apply mathematical reasoning to analyse essential features of different problems; 2. extend their knowledge of mathematical and numerical techniques and adapt known solutions to different situations in engineering; 3. apply appropriate numerical techniques to model and solve problems in engineering; 4. search for useful information in solving problems in the context of building services engineering.
Subject Synopsis/ Indicative Syllabus	*Matrices and determinants:* Matrices and determinants; Systems of linear equations; Cramer's rule; Inverse of a matrix; Gaussian elimination; Elementary row operations; Eigenvalues and eigenvectors. *Vector methods:* Simple properties; Dot and cross products; Applications; Gradient, divergence, curl. *Numerical methods:* Numerical methods for linear systems; LU decomposition; Gauss-Seidel method; Solutions of non-linear equations; Newton-Raphson methods; Numerical integration using trapezoidal and Simpson's rules; Solution of ordinary differential equations; Euler's and Runge-Kutta methods; Finite difference method for solution of Laplace equation; Curve fitting by least squares method. *Linear programming:* Fundamental theorem of linear programming; Graphical methods; Simplex method.
Teaching/Learning Methodology	In addition to traditional lecturing and tutorial classes, online interactive materials are available in the WebCT platform so that blended learning is achieved. Hands-on trial and testing on selected topics using the computer are available. Problems randomly selected from a database by the computer in the form of quiz will be given to reinforce their learning.

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. Continuous Assessment	40%	✓	✓	✓	✓
b. Examination	60%	✓	✓	✓	
Total	100 %				

Tutorial exercises, assignments and relevant problems will be given to students. The use of computer as a tool is encouraged. Their work will be assessed and returned. Solution or suggested answers will be posted afterwards.

To pass this subject, students are required to obtained Grade D or above in both the continuous assessment and examination components.

Student Study Effort Required

Class contact:	
▪ Lecture	28 Hrs.
▪ Tutorial and Student Presentation	14 Hrs.
Other student study effort:	
▪ Assignments	28 Hrs.
▪ Self-study	56 Hrs.
Total student study effort	126 Hrs.

Reading List and References

Textbook:

Chan, C.K., Chan, C.W. & Hung, K.F.	Basic Engineering Mathematics Updated 3rd edition	McGraw Hill 2011

References:

Chapra, S.C. & Canale, R.P.	Numerical Methods for Engineers 6th edition	McGraw Hill 2009
Thomas, G.B., Weir, M.D. & Hass, J.R.	Thomas' Calculus 12th edition	Addison Wesley 2009
Gerald, C.F. & Wheatley, P.O.	Applied Numerical Analysis 7th edition	Addison Wesley 2003