FAKULTI KEJURUTERAAN
UNIVERSITI KEBANGSAAN MALAYSIA

(1) Course Code: KKKQ1114

(2) Course Name: Engineering Mathematics 1 (Algebra)

(3) Course Type: Faculty (Compulsory)

(4) Goal and Summary of Course Content:

This goal of this course is to highlight to the students of the importance of linear algebra in engineering. The course begins with complex number, hyperbolic functions and power series expansion. The main topics are matrix and determinant, Cramer Rule, eigen value and eigen vector, similarity of matrix, scalar and vector multiplication, vector as tensor of first order, complex matrix, quadratic form of matrix, matrix diagonalization and Cayley-Hamilton Theorem. Several important applications of linear algebra in engineering are given.

(5) Pre-requisite:

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(6) Reference

Nakos, G. and Joyner, D. 1998. *Linear Algebra with Applic*ations. Singapore: Thomson Publishing Company.

Kreyszig, E. 1999. *Advanced Engineering Mathematics*. 8th Edition. New York: Wiley.

O'Neil, P. V. 2003. *Advanced Engineering Mathematics*. 5th Edition. Singapore: Thomson Brooks/Cole.

Zill, D. G. and Cullen, M. R. 2000. *Advanced Engineering Mathematics*. 2nd Edition. Sudbury, Massachusetts: Jones and Bartlett Publishers.

Shaharir Mohamad Zain. 1991. *Vektor dan Tensor: Pengenalan Pendekatan Terkamir*. Kuala Lumpur: Dewan Bahasa & Pustaka.

Week	Topics
1	Complex Number
2	Hyperbolic Function and expansion of function in the form of power series.
3	Matrices: Additional, scalar multiplication and matrix multiplication. System of linear equation. Gauss elimination.
4	Determinant, Inverse matrix and Cramer's Rule.
5	Vector Space and Subspace.
6	Linear independence, Basis, Dimension. Rank of matrix.
7	Change of Basis: Gram_Schmidt Orthogonolization Process
8	Eigenvalue and eigenvector.
9	Power of Matrices.
10	Orthogonal matrices. Symmetric matrix , Approximation to eigenvalues
11	Diagonalization.
12	Applications:Cryptography, Error correcting code, method of least squares, discrete compartmental models
13	Vector as tensor in first order.
14	Cartesian Tensor and its application.

(7) Course Outcomes Matrix

No.	Course Outcomes (CO)	OP 1	OP 2	OP 3	OP 4	OP 5	OP 6	OP 7	OP 8	OP 9	OP 10	OP 11	OP 12	Delivery	Assessment and Evaluation
1	Understand the basic concept of complex number, hyperbolic function and power series expansion.	2							1					Discussion in lecture and tutorial.	Tutorial, quiz and examination.
2	Understand the basic concept of matrix, determinant, rank, scalar and vector multiplication.	2							1					Discussion in lecture and tutorial.	Tutorial, quiz and examination.
3	Understand the concept of complex matrix, similarity of matrix, matrix quadratic form and diagonalization of matrix.	2			2									Discussion in lecture and tutorial.	Tutorial, quiz and examination.
4	Understand the concept of eigenvalue and eigenvector.	2							1					Discussion in lecture and tutorial.	Tutorial, quiz and examination.
5	Able to use the matrix in application of engineering problems.	3			2									Discussion in lecture and tutorial, and problem solving.	Tutorial, quiz and examination, and presentation in group.
6	Understand the basic concept of tensor.	1												Discussion in lecture and tutorial.	

1 = Fulfilll PO without formal assessment, 2 = Partially fulfill PO with formal assessment, 3 = Fully fulfill PO with formal assessment

OP1 – application of basic knowledge
OP2 – Communicaiton
OP3 – Technical skill
OP4 – problem identification and solution with modern tools.
OP5 – system approach
OP6 – teamwork and management quality
OP7 – etique
OP8 – lifelong learning
OP9 – experimental design and data interpretation
OP10 – multidiciplinary team
OP11 – current issues
OP12 – project management and entrepreneurship

(8) Assessment Distribution

Tutorial:	10%-15%
Quiz:	10%-15%
Mid-Semester Exam:	15%-25%
Final Exam:	50%-60%
TOTAL	100%