Course Specification
Electronic and Electrical Engineering
School of Science and Technology, Sunway University, Malaysia

Section 1: Course Summary

Course Name	Engineering Mathematics 1
Course Code	ENG1013
Lecturer(s)	Dr. Yeong Lee Seng
Category	Core
Semester/Year Offered	Semester 2 / Year 1
SLT Credit Hours	3
Pre-requisite (if any)	None
Synopsis	This course introduces students to mathematics for engineering applications. Topics include algebra, functions, polynomial expressions, binomials, complex numbers, sequences, series, scalar and vector, and matrices.
Transferable Skills	Analytical Skills, Problem-Solving and Mathematical Skills
Delivery Method	Lectures and Tutorials

Section 2: Course Outcomes

Mapping of the Course Outcomes (CO) to Programme Outcomes (PO), Knowledge Profile (WK), Complex Problem Solving (WP), and Complex Engineering Activities (EA).

At the end of this course, the student will be able to:

Course Outcome (CO)	
CO1	**Apply** concepts of functions, complex number, matrices, and vector algebra treatment in engineering mathematics.
CO2	**Analyze** a specific engineering problem using methods introduced in functions, complex number, matrices and vector algebra.
CO3	**Apply** proper techniques to solve polynomial equations related to an engineering problem.
CO4	**Apply** proper techniques of sequences and series to solve engineering mathematics problem.

Note: LD/BT = Learning Domain/Bloom's Taxonomy

Mapping of the Course Outcomes (CO) to Programme Outcomes (PO), and Programme Educational Objectives (PEO). Relational Indicator is "X".

CO	PO												PEO		
	1	2	3	4	5	6	7	8	9	10	11	12	PEO1	PEO2	PEO3
CO1	X												X		
CO2		X											X		
CO3	X												X		
CO4	X												X		

Section 3: Teaching-Learning Assessment Strategy

Mapping of the Assessment Components and Assessment Methods to the Course Outcomes (CO). Relational Indicator is "X".

Assessment Components	Assessment Methods	Weightage (%)	CO1	CO2	CO3	CO4
Written Assessment	Test 1	20	X	X		
	Test 2	20			X	X

	Final Examination	60	X	X	X	X

Mapping of the Teaching-Learning Activities and Assessment components to the Programme Outcomes (PO).

Programme Outcomes (PO)	Teaching-Learning Activities	Assessment Components
PO1	Lectures, Tutorials	Test, Final Examination
PO2	Lectures, Tutorials	Test, Final Examination

Section 4: Teaching Plan and Student Learning Time (SLT)

Summary of total Student Learning Time (SLT).

SLT Components: L = Lecture T = Tutorial P = Practical A = Assessment O = Others	Face to Face					Independent Learning
	L	T	P	A	O	IL
	28	28	0	3	0	61
Total SLT Hours	120					
SLT Credit Hours	3					

Teaching Plan and Student Learning Time (SLT).

Teaching-Learning Plan: Course Topic and Outline	Student Learning Time (SLT)						Topic SLT
	L	T	P	A	O	IL	
Introduction to Algebra • Algebraic Expressions • Powers and Logarithms (Indices and Logarithms) • Algebraic Multiplication and Division • Algebraic Fractions (Partial Fractions) • Factorization of Algebraic Expressions	2	2				2	6
Functions • Basic Definition • Linear and Quadratic Function • Polynomial Function • Rational Function • Circular Function • Exponential Function • Logarithmic Function • Hyperbolic Function	3	3				3	9
Polynomial Expressions and Equations • Quantifiers and Inequalities • Polynomial Expressions • Evaluation of Polynomials • Factorization of Polynomials	3	3				3	9
Binomials • Factorials and Combinations • Binomial Expansions • Sigma Notation	2	2				2	6
Complex Numbers • Complex Numbers and Complex Plane • Polar Form • Complex Conjugate Root • Powers and Roots	3	3				3	9

• De Moivre's Theorem • Engineering Applications of Complex Numbers							
Sequences • Finite and Infinite • Convergent Sequences	3	3				3	9
Series • Finite and Infinite • Absolute and Conditional Convergence • Arithmetic and Geometric Progressions • Convergent and Non-convergent Series • Power Series for Sin, Cos, Ln and Exp	3	3				3	9
Scalar and Vector • Types of Vector • Addition of Vectors • Cartesian Components • Complex Numbers as Vectors • Scalar Product • Vector Product • Inner Product	3	3				3	9
Matrices I • Notation • Square Matrices • Addition and Subtraction of Matrices • Multiplication of Matrices • Transpose of a Matrix • Special Matrices	2	2				2	6
Matrices II • Determinant of a Square Matrix • Inverse of a Square Matrix • Solution of a Set of Linear Equations • Gaussian Elimination Method • Matrix Rank • Eigenvalues and Eigenvectors	4	4				4	12
Test 1				2		10	12
Test 2				2		10	12
Final Examination				2		10	12
Sub-total for each SLT components	28	28		6		58	120
Total SLT Hours (15 Weeks)	120						
SLT Credit Hours	3						

References:

Main Reference	K. A. Stroud and D. J. Booth, Engineering Mathematics, 8th Edition, 2020, Red Globe Press
Additional References	John Bird, Engineering Mathematics, 8th Edition, 2017, Routledge. John Bird, Higher Engineering Mathematics, 8th Edition, 2017, Routledge.