

Module Code	MA1012	Title	Mathematics			
Credits	03	Hours/ Week	Lectures	03	Prerequisites	MA0010
			Lab/Tutorial	01		
Learning Objectives						
<ul style="list-style-type: none"> To develop the skill in Mathematical Logic required in engineering applications. To develop the knowledge on basic Calculus required in engineering applications. To provide a working knowledge of basic probability and statistics in engineering application.. 						
Learning Outcomes						
<ul style="list-style-type: none"> Understand the concept of Discrete Structures in Mathematics such as Logic, and Set Theory Understand the concept of Algebraic Structures in Mathematics such as Real Numbers, Complex Numbers, Vectors and Matrices. To understand the basic concepts in Analysis such as Limits, Differentiation and Integration Understand modern concepts of statistical thinking and its foundations on probability 						
Outline Syllabus						
<u>Logic and Set Theory</u>						
Propositions, Truth tables, Quantifiers, Techniques of Proof: Direct, Contradiction, Induction; Sets, Cardinality, Power Set, Cartesian Product, Ordered Pairs, Relations, Functions, Inverse Relations and Functions, Composite Relations and Functions.						
<u>Real Analysis</u>						
Real Number System, Real Intervals, Supremum and Infimum, Completeness Axiom, Powers on Numbers, Basic Functions: Polynomial, Exponential, Trigonometric, Hyperbolic; Their Inverses, Limit of a Function, Extended Real Number System, Continuity, Differentiability, Derivative and Higher Derivatives, Maxima and Minima, Rolle's Theorem, Mean Value Theorem, L' Hospital's Rule, Sequences, Cauchy Sequences, Infinite Series, Convergence of Series: Ratio Test, Comparisons Test, Limit Comparison Test, Maclaurine's Integral Test; Harmonic Series, Infinite Products, Power Series, Taylor's Series, Integration of Continuous Functions, Definite and Indefinite Integrals.						
<u>Complex Numbers, Vectors, and Matrices</u>						
Algebra of Complex Numbers, De Moivre's Theorem, Argand Diagram, Vector Algebra, Scalar Triple Product, Vector Triple Product, Line and Plane, Matrix Algebra, Echelon Forms, Rank, Determinants, Eigen Values, Spectral Radius, Matrix Norms: Maximum Row Sum, Maximum Column Sum; System of Linear Equations, Existence of Solutions.						
<u>Basic Probability</u>						
Pigeon-Hall Principle, Permutations and Combinations, Basic Laws and Elementary Theorems in Probability, Conditional Probability, Baye's Theorem, Integer Equations, Discrete and Continuous Random Variables. Probability and Cumulative Distribution functions, Joint Distribution Function, Integer Equations, Generating Functions for Experiments,						