Semester	Code	Module Title	Credits	C/E/O	GPA/NGPA
1	MA1113	Mathematics for Transport and Logistics I	3	C	GPA

Hours/Week		Pre-requisites/Co-requisites	Evaluation (%)	
Lecture	Tute/Lab		CA	WE
5/2	1/1	None	40	60

Learning Outcomes

After the successful completion of this course, students should be able to
- Obtain an understanding of the techniques of Logic and Set theory, Real analysis, Vectors and Matrices and Ordinary Differential equations and their role in the development of fundamental theories in transportation and logistics
- Use algebraic structures such as Real numbers, Vectors and Matrices, and Ordinary differential equations in applications
- Apply the basic concepts in transportation and logistics applications

Syllabus Outline

Linear Algebra
- Vector Algebra: Vector product, Scalar product, Scalar triple product, Vector triple product, Equations of lines and planes
- Matrix Algebra: Operations of the matrices, Echelon Forms, Rank, Determinants, Inverse of matrix, System of Linear Equations, Existence of solutions, Cremer's Rule, Eigen values and Eigen vectors, Diagonalization

Ordinary Differential Equations
- First order ordinary differential equations: Variable separable, Homogeneous, Exact and reducible forms
- Second order ordinary linear differential equations, Homogeneous and non-homogeneous

Logic and Set Theory
- Logic: Propositions, Truth tables, Symbolic statements, Conditional connectives, Quantifiers
- Techniques of Proof: Direct, Contradiction, Induction, Pigeon-Hole principle
- Set Theory: Cardinality, Cartesian product, Ordered pairs
- Boolean Algebra: Disjunctive and Conjunctive normal forms, Logic gates, Karnaugh maps, minimization.

Real Analysis

- Real Number System
- Basic Functions: Polynomial, Exponential, Trigonometric, Hyperbolic and their inverses
- Limit of a Function, Continuity, Differentiability, Derivatives
- Rolle's Theorem, Mean Value Theorem, Taylor's series, L' Hospital's Rule
- Sequences and Series and Convergence of Series.