Semester	Code	Module Title	Credits	C/E/O	GPA/NGPA
2	MA1122	Mathematics for Transport and Logistics II	3	C	GPA

Hours/Week		Pre-requisites/Co-requisites	Evaluation (%)	
Lecture	**Tute/Lab**		**CA**	**WE**
5/2	1/1	MA 1113	40	60

Learning Outcomes

After the successful completion of this course, students should be able to
- Obtain an understanding of the techniques of Numerical Analysis, Graph Theory and Fundamentals of Probability theory
- Understand the role of above concepts in the development of fundamental theories in transportation and logistics
- Apply the basic concepts in transportation and logistics applications

Syllabus Outline

- Functions of several variables: Partial differentiation, Chain rule, directional derivatives
- Maxima and minima, Lagrange multipliers
- Taylor series expansion of multivariate functions
- Algorithms and errors, Numerical solution of non-linear equations: Bisection and False position methods, Fixed point iterative method, Newton-Raphson Method
- Estimation of errors and acceleration of convergence, Approximations of functions
- Numerical integration: Trapezoidal rule, Simpson's rule
- Basic definitions, Degree of a vertex, Paths, cycles and connectivity. Digraphs, relationship graphs
- Shortest path problems: Dijkstra's algorithm. Isomorphism of graphs, Adjacency
- Trees: Properties, spanning trees, Rooted trees, Binary trees
- Conditional probability, Bayes' theorem
- Discrete and continuous random variables, Probability and cumulative distribution functions, Joint distribution functions, Uniform, Binomial, Poison and their applications
- Basic statistical indicators in data analysis, correlation coefficients, Normal distributions and its applications