

Module Code	MA3022	Title	Numerical Methods			
Credits	02	Hours/Week	Lectures	02	Pre-requisites	MA 1022
			Lab/Tutorials	-		
<u>Learning Objectives</u>						
<ul style="list-style-type: none"> • To introduce numerical Optimization Algorithm which can be easily implemented in Computer, • To introduce various numerical algorithm to solve Ordinary and Partial differential equation. • Introduce the various numerical algorithms to calculate eigenvalues of matrix. • To chose the best method among the alternatives, based on errors and convergence characteristics. • To introduce the Finite Element Methods applied in Engineering. • Introduce MATLAB to implement all published algorithm studied in this course 						
<u>Learning Outcomes</u>						
<ul style="list-style-type: none"> • To apply simple search and simple gradient methods in optimizing multivariable function. • To apply Taylor series to derive various implicit and explicit algorithm in solving ODE. • To compare different algorithm in terms of implementation in computers, and accuracy. • To apply different numerical scheme to find solution of different types of PDE. • To apply FEM in solving simple problems 						
<u>Outline Syllabus</u>						
<p>Numerical optimization problems (direct search and simple gradient methods)Solution of set of non-linear equations. Matrix eigenvalue determination including direct, inverse iteration and shift of origin, special methods for dealing with band type and sparse matrices. Simple error analysis, convergence properties. Simple finite difference technique for initial-value and boundary-value problems in ordinary and partial differential equations and systems. Phase plane and isoclinical curves. Taylor series, Runge-Kutta process. Explicit and implicit procedures, simple ideas on errors and stability. Introduction to method of characteristics. Finite Element Methods Practical Work: Use of published algorithms and packages for solving numerical problems</p>						