

| Semester | Code | Module Title | Credits | C/E/O | GPA/NGPA |
|------------|----------|------------------------------|----------------|-------|----------|
| 3,4,5 | MA3024 | Numerical Methods | 2 | E | GPA |
| Hours/Week | | Pre-requisites/Co-requisites | Evaluation (%) | | |
| Lecture | Tute/Lab | | CA | WE | |
| 2 | 0 | MA1024 | 30 | 70 | |

Learning Outcomes

After the successful completion of this course students should be able to

- Demonstrate knowledge and understanding of common numerical methods
- Apply numerical methods to obtain approximate solutions
- Compare different numerical methods using efficiency and accuracy of the solution

Syllabus Outline

Solving Systems of Linear Equations

- Condition of a linear System
- Direct methods
- LU decomposition
- Symmetric, Positive definite Matrix decomposition
- Tri diagonal Matrix decomposition

Numerical Solutions of System of Non-Linear Equations

- Fixed Point iteration
- Newton's Method

Curve Fitting

- Splines

Numerical Optimization

- Multi-dimensional
- Steepest decent

Numerical Solutions of Initial Value Problems for of ODEs

- Single step methods
 - Euler's Method & Modified Euler Method
 - Runge-Kutta methods
- Numerical Solutions of a System of IVP s
- Multi-Step methods
 - Adams methods (implicit, explicit)
 - predictor-corrector methods

Numerical solution of Linear & Nonlinear BVP s

- Shooting Method
- Finite Difference Approximation