Semester	Code	Module Title	Credits	C/E/O	GPA/NGPA
2	MA1024	Methods of Mathematics	3	C	GPA

Hours/Week		Pre-requisites/Co-requisites	Evaluation (%)	
Lecture	Tute/Lab		CA	WE
5/2	1/1	MA1014	30	70

Learning Outcomes

After the successful completion of this course students should be able to
- Understand the basic numerical techniques and its applications
- Understand the basic theories on severable variable calculus and its applications
- Understand the basic concepts of Probability and Statistics and identify the applications of them

Syllabus Outline

Numerical Methods
- Numerical solution of non-linear equations: Bisection, Fixed point, Newton's methods.
- Numerical differentiation and integration: Trapezoidal and Simpson's rules.
- Interpolation: Lagrange polynomial, Newton's Divided Difference and Least Square method.
- Numerical solution to systems of equations: Gauss-Jacobi Gauss-Seidel methods
- Numerical solution to ODEs-Euler' s method
- Numerical Optimization-Golden section search, method of finding roots of the derivative

Multivariate Calculus and Introductions to PDEs
- Limits, Continuity, Partial Derivatives, Mean Value Theorem, Differentiability
- Chain rule-Bivariate
- Gradient, Tangent plain, Directional derivatives
- Jacobian, Hessian
- Inverse Function Theorem, Implicit Function Theorem.
- Maxima, minima and Saddle points, Lagrange multipliers
- Taylor series expansion for two variable, quadratic forms
- Double integrals: Fubini's theorem, Change of variables, polar coordinates
- Solution of the exact ODE
- Introduction and solve first order PDE, Solution by the method of Characteristics

Probability and Statistics
- Random experiments and random events
- Concept of probability, computing probability using two-way tables
- Conditional probability and Bayes theorem.
- Discrete and continuous random variables and their properties
- Distributions and their applications (Bernoulli, Binomial, Poisson, Uniform and Normal distribution)
- Normal approximation for Binomial & Poisson and their applications
- Student's t–distribution
- Estimation of parameters: point estimators and their properties
- Central Limit Theorem and its applications
- Confidence intervals for mean
- Covariance and correlation coefficient