

Branch Name:	Computer Engineering/Information Technology/Information and Communication Technology
Program Code:	ET103/ ET105/ET107
Course Name:	Engineering Mathematics with Computational Methods
Course Code:	2ET1000401T
Pre-requisite Course:	Basic knowledge of Differentiation, Integration and Differential Equations.

Course Objectives:

- CO1- Be capable for the evaluation of the solutions to ODEs, finding unknown entry in a given data, and integration, by using numerical methods.
CO2- Find the solutions to non-linear algebraic equations and understand the rate of convergence.
CO3- Understand the fundamental concepts in probability and statistics.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
4	3	1	-	4	24	60	16	40	-	-	-	-	100

Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1.	Roots of Non- Linear Equations: Bisection, Regula-Falsi, Secant method, Successive approximation method, Newton-Raphson method, Rate of Convergence.	6	15
2.	Finite Differences: Finite differences, Interpolation, Newton's formulae, Lagrange's and Divided difference formula for unequal intervals.	6	15
3	Numerical Integration: Newton-Cotes integration formulas: Trapezoidal rule, Simpson's rules, Gaussian Quadrature formulae: one, two and three points.	5	10
4	Numerical Solution of First Order Linear Ordinary Differential Equations: Taylor's method, Euler's methods, Runge-Kutta method of order four, Milne's Predictor-Corrector method.	5	10
5	Curve fitting by the numerical method: Curve fitting by method of least squares, fitting of straight lines, second degree parabola and more general curves.	5	10
6	Statistics: Random variable: Continuous and discrete, Mathematical Expectation, Variance, Standard Deviation, Coefficient of variation, Binomial, Poisson and Normal distributions, Mean, Median, Mode, Skewness, Karl Pearson's coefficient of skewness, Kurtosis. Bivariate distribution, Correlation coefficients, Regression lines, Formulas for Regression coefficients, Rank correlation.	17	40

Text Books:

1. Introductory Methods in Numerical Analysis By S. S. Sastry.
2. Numerical Methods in Science & Engineering Prog.- By Dr. B. S. Grawal, Khanna Pub., New Delhi.
3. Computer Oriented Statistical and Numerical Methods By E. Balagurusamy, TMH.
4. Statistical Methods, S.P. Gupta, Sultan and Chand Publications.
5. Numerical Methods for engineers. S C Chapra and R P Canale .McGrow Hill International Edition

Reference Books:

1. Erwin Kreyszig: Advanced Engineering Mathematics, 8th Ed., John Wiley & Sons, India, 1999
2. Probability and Statistics for Computer Science by James L. Johnson

ICT/MOOCs:

1. <https://nptel.ac.in/>. For example: <https://nptel.ac.in/courses/111107062/> (For Computational Error, IIT Roorkee, NPTEL)

List of Open Source Software/learning website:

1. NPTEL Video Lectures. www.nptel.ac.in

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Solve non-linear algebraic equations by using numerical methods and understand the rate of convergence of it.	L4- Analyze L5- Evaluate
CLO2	Find unknown value of given data by using various interpolation methods and curve fitting.	L5- Evaluate
CLO3	Calculate integration and solve differential equations by using numerical methods.	L4- Analyze L5- Evaluate
CLO4	Understand the terminologies of basic probability.	L2- Understand
CLO5	Understand the central tendency methods.	L2- Understand

Mapping of CLOs with PO's & PSO's

Course Learning Outcomes	Program Outcomes(POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	M	M			M											
CLO2	M	M			M											
CLO3	H	M	L		M											
CLO4	M	L			L											
CLO5	H	M														

H: High, M: Medium, L: Low