

Branch Name:	Transportation Engineering
Program Code:	ET211
Course Name:	Numerical Methods and Statistical Analysis
Course Code:	2ET2110101T
Pre-requisite Course:	Zeal to learn the subject

Course Objective:

1. To provide the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
2. To introduce the basic concepts of solving algebraic and transcendental equations.
3. To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration this plays an important role in engineering and technology disciplines.
4. To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (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

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Motivation, Data and Decisions, Measurement Uncertainties, Random processes. Various Statistical Measures.	3	7
2	Basic Probability, Sample Space, Events, Axioms of Probability, Sample space with equality likely outcomes, Conditional probability, Independent events.	4	12
3	Random number generation. Sample statistics, empirical distributions, goodness of fit, and sampling from normal populations.	4	12
4	Random Variables, Continuous/Discrete random variables, exception, valance, convenience, conditional distributions, moment generating functions. Multiple regressions.	4	12
5	Distributions, Bernoulli, Binomial, Poisson, Uniform, Normal, Exponential, Chi square test, t-test and F-test. Interpolation And Curve Fitting	4	12
6	Hypothesis testing, Significance Intervals.	8	12
7	Parameter estimation, moment method, maximum likelihood, interval estimation.	8	12
8	Matrix Factorization and Linear System Cholesky Factorization, QR factorization by House holder matrices Lufactorization and Gaussian elimination, partial pivoting, error Analysis (statement of result) soling triangular system by substitution, solving full systems by factorization. Lu-factorization for banded and sparse matrices, storage schemes, Iterative Methods, Jacobi, Gauss - Seidal and SOR Iterations, Conjugate gradient method, preconditioning.	6	12
9	Interpolation and Curve fitting	4	9

Reference Books:

1. Probability and Statistics for Engineers -Miller, Freund-Hall, Prentice India Ltd.
2. Probability and Statistics for Engineers -Johnson Richard, Prentice India Ltd.

3. Introduction to Probability & Statistics for Engineers & Scientists-Ross Sheldon, Elsevier Pub
4. Sampling techniques-Cochran, Wiley Series.,
5. Statistics-Concepts and Controversies-David S. Moore-Freeman Company, New York.
6. MATLAB an Introduction with Application, Gilat Amos. Willey Pub.
7. Getting Started with MATLAB -PratapRudra -Oxfor Pub
8. Mastering MATLAB 7 -Hanselman-Pearson
9. Programming in MATLAB for Engineers-Chapman S.J.-Cengage Pub.
10. Effective Technical Communication -Rizvi Ashraf-Tata McGraw Hill Pub.
11. Numerical Methods -Balagurusamy E- Tata McGraw Hill Pub.
12. Numerical Methods-Jain M.K.-New Age Pub.
13. Numerical Methods for Engineers-Chapra Steven- Tata McGraw Hill Pub.
14. Computer Oriented Numerical Methods-Rajaraman V.-PHI Pub

Course Learning Outcome:

Upon successful completion of the course, students will be able to::

1. Apply the concept of testing of hypothesis for small and large samples in real life problems.
2. Identify risks associated with floating point computations.
3. Applying various graphical and data analysis methods for summarizing and understanding data.

Assignment work on

- Probability distribution
- Sampling distribution
- Correlation
- Regression analysis
- Multivariate analysis
- Hypothetical testing

Course Learning Outcomes (CLO):

After successful completion of the course the students shall be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Apply the concept of testing of hypothesis for small and large samples in real life problems	L-1, L-2, L-3
CLO2	Identify risks associated with floating point computations	L-1, L-2
CLO3	Various graphical and data analysis methods for summarizing and understanding data	L-1, L-2,L-3

L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with Pos & PSOs

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

H: High, M: Medium, L: Low