INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

Ist Semester 2025-26

COURSE HANDOUT

Course Number : MAL2010

Course Title : Probability, Statistics and Stochastics Processes

Instructor : Vivek Vijay

1. Text Books:

T: Sheldon M. Ross, Introduction to probability and statistics for engineers and scientists, Elsevier, 2012.

2. Reference Books:

- Richard A. Johnson, Miller and Freund's Probability and Statistics for Engineers, PHI Learning, 2010.
- Athanasios Papoulis and S. Unnikrishna, Probability, Random Variables, and Stochastic Processes, Tata Mc-gray Hill, 2002.
- Vijay K. Rohatgi and A. K. Md. Ehsanes Saleh, An introduction to probability and statistics, Wiley, 2011.

Course Plan:

Lecture Number	Topic
1	Overview of the Course, Sample Space and Events, Probability Definitions
2	Probability Axioms, Properties
3, 4	Conditioning, Conditional Probability, Independent Events, Bayes Theorem
5	Why Random Variable? Discrete and Continuous Random Variables and their distributions
6, 7	Functions of Random Variables, Expectation, Variance, Moments
8, 9	Moment Generation Function and Characteristic Function, Properties
10, 11	Special Discrete Distributions with Applications – Binomial,

	Poisson, Geometric
12, 13	Special Continuous Distributions – Uniform, Exponential, Beta, Gamma
14	Gaussian (Normal) Distribution
15	Moment Inequalities (Markoff, Chebychev etc)
16, 17	Transformation of Variables
18, 19	Joint and Marginal Distributions, Conditional Distribution
20, 21	Conditional Expectation, Covariance Matrix, Correlation
22	Independence of Random Variables
23, 24	Transformation of Variables
25	Random Vector, Weak Law of Large Numbers, Central Limit Theorem
26	Bivariate Normal Distribution
27	Regression, Least Square Method
28, 29, 30	Sampling Distributions of Parameters, Chi-Square, t and F Distribution
31, 32	Theory of Point Estimation, Properties of Point Estimator
33, 34	Maximum Likelihood Estimator
35, 36	Interval Estimation, Confidence Interval,
37, 38	Testing of Hypotheses, Goodness of Fit test
39, 40	Stochastic Processes, Markov Chain, Markov Process

Evaluation Policy (Tentative)

Mode	Weightage	Tentative Date	Syllabus
Quiz I	10%	August 19, 2025	Lectures 1 – 8
Quiz II	10%	TBD	
Quiz* III	10%	TBD	
Minor Exam	30%	Sept 16-19, 2025	Lectures 1 – 16
Major Exam	40%	Nov 20-26, 2025	Full Syllabus
Class/ Tutorial Participation / Assignment	10%		
Attendance Policy			Expecting full attendance

*Best two out of three quizzes will be considered.