

Branch Name:	Artificial Intelligence and Data Science
Program Code:	ET108
Course Name:	Probability and Statistics
Course Code:	2ET1080405T
Pre-requisite Course:	Basic knowledge of mathematics.

Course Objectives:

1. This course provides a comprehensive introduction to probability theory and statistical data analysis.
2. To develop students' understanding of fundamental probability concepts and equip them with essential statistical techniques to analyze and interpret data.
3. Emphasis will be placed on the application of probability and statistics in AI and data science domains.
4. To impart basic managerial skills for collection & analysis of statistical data & taking prompt decisions.

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.	Topics	Total Hours	Weightage (%)
1	Basic Probability: Probability spaces, conditional probability, independence, Bayes theorem, Discrete random variables, Independent random variables, sums of independent random variables; Expectation of Discrete and Continuous Random Variables, Moments, Variance of a sum	9	20
2	Basic Statistics: Measures of Central tendency, Moments, skewness and Kurtosis, Binomial, Poisson and Normal distribution and evaluation of statistical parameters for these three distributions (Distribution functions, Mean and Variance).	8	20
3	Bivariate Statistics: Correlation and Regression – Concepts of Correlation, Coefficient of Correlation, Rank correlation, Regression Analysis - linear & multivariable regression, Curve fitting by the method of least squares-fitting of straight lines, second degree polynomials	8	20
4	Sampling Theory: Introduction to sampling distributions, Standard Normal Variate, Central Limit Theorem, standard error, Type-I and Type-II errors, estimation, confidence intervals	8	20
5	Applied Statistics: Test of significance: Large sample test for single mean, difference of means, and difference of standard deviations, Small samples test for single mean, difference of means, Paired t-test, Chi-square test for goodness of fit and independence of attributes,	12	20

Text Books:

1. "Probability and Statistics for Engineering and the Sciences" by Jay L. Devore
2. "Introduction to Probability" by Dimitri P. Bertsekas and John N. Tsitsiklis
3. "Statistical Inference" by George Casella and Roger L. Berger
4. "Introduction to Linear Regression Analysis" by Douglas C. Montgomery, Elizabeth A. Peck, and G. Geoffrey Vining
5. An Introduction to Statistical Learning: with Applications in R, by Gareth James, Daniela Witten, Trevor Hastie, Thirty Sixth Edition 2017

Reference Books:

1. Quantitative Techniques for Managerial Decision by Srivastava, New Age

2. An Introduction to Statistical Learning: with Applications in R, by Gareth James, Daniela Witten, Trevor Hastie, Thirty Sixth Edition 2017
3. Probability & Statistics for Engineers by Rao, SCITECH
4. Statistics for Management by Lewis, Pearson
5. Quantitative Techniques in Management by Vohra, TMH
6. Applied Statistics & Probability for Engineers by Sharma, Willey
7. Introduction to Probability & Statistical Application by P.A. Meyer
8. Introduction to Probability Theory, P. G. Hoel, S. C. Port and C. J. Stone, Universal BookStall Reprint 2003

List of Open-Source Software/learning website:

1. Khan Academy: The Khan Academy website provides free online courses and tutorials on various topics, including probability, statistics, and data analysis. You can visit their website at <https://www.khanacademy.org/>.
2. Coursera: Coursera offers online courses from top universities and institutions worldwide. They have a variety of courses related to probability, statistics, and data analysis. You can explore their offerings at <https://www.coursera.org/>.
3. <https://www.statisticssolutions.com/continuous-probability-distribution>
4. <https://nptel.ac.in/courses/111/106/111106112/>
5. <https://nptel.ac.in/courses/111/105/111105124/>
6. <https://www.youtube.com/watch?v=L-pQtGm3VS>
7. <https://www.youtube.com/watch?v=vN5cNN2-HWE>

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

CLOs	Description	Bloom's Taxonomy Level
CLO1	Apply the concept of probability random variables, mathematical expectations and variance.	L1- Remember L2 -Understand L3-Apply
CLO2	Find distributions - Binomial, Poisson, Normal, distributions, their Mean and Variance, Measures of Central Tendency and Dispersion, Moments,	L2 -Understand L3-Apply
CLO3	Apply the concept of Correlation and Regression to the engineering problems. Least square method for curve fitting.	L2 -Understand L3-Apply
CLO4	Understand the sampling technique used to draw a conclusion about statistical interference.	L1- Remember L2 -Understand
CLO5	Test Hypothesis for means and variance, t- test, Chi-square test	L1- Remember L2 -Understand L3-Apply

Mapping of CLOs with POs & PSOs

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	L	L			L											
CLO2	M	M	L		M											
CLO3	H	M			M											
CLO4	L	M	L													
CLO5	M	M	L		M											

H: High, M: Medium, L: Low