M. Sc. (Statistics)
Semester - I

Course Code	PS01CSTA24	Title of the Course	STATISTICAL INFERENCE I
Total Credits of the Course	04	Hours per Week	04

Main Focus of the Course outcomes	Employability	Skill Development	Entrepreneurship
	✓	✓	
Course Objectives:	To familiarize the concept of sufficiency and its importance in summarization of data, various methods for estimation and various approaches of estimation.		

UNIT 1	Sufficiency principle, factorization theorem, minimal sufficiency, minimal sufficient partition, construction of minimal sufficient statistics, minimal sufficient statistic for exponential family, power series family, curved exponential family Pitman family. Completeness, bounded completeness, ancillary statistics, Basu's theorem and applications.	**12 L**
UNIT 2	Unbiased estimators; Uniformly Minimum Variance Unbiased Estimators(UMVUE); Rao-Black and Lehmann-Scheffee theorems. Problem of point estimation, unbiased estimators, minimum variance unbiased estimator, Rao- Blackwell theorem and Lehmann-Scheffe theorem and their uses. Fisher information and information matrix, Cramer-Rao inequality, Chapmann Robinson bounds, Bhattacharya bounds, their applications.	**12L**
UNIT 3	Method of maximum likelihood (MLE) and small sample properties of MLE, method of scoring and application to estimation in multinomial distribution.MLE in non-regular families. Other methods of estimation: method of moments, minimum Chi square.	**12L**
UNIT 5	Baye's estimators: Statistical Problems viewed as problems of game theory; loss function; risk function; prior and posterior distributions; Bayes risk; Baye's	**12L**

	functions. Equivariance; the principle of equivariance;location –scale family and their properties; Pitman's minimum risk equivariance estimators.	

Course Outcomes: Having completed this course, the learner will be able to	
1.	know the concepts of sufficiency and completeness and related theorems
2.	to estimate the parameters of regular and non-regular distributions
3.	to apply various inequalities to obtain lower bounds for the variance of unbiased estimators.

Books Recommended:

1.	B. K. Kale , K. Muralidharan(2015).Parametric Inference: An Introduction, Alpha Science International Ltd.
2.	Dudewicz, E. J. and Mishra, S.N.(1988) Modern Mathematical Statistics (John Wiley)
3.	Roussas, G. G. (1973) First Course in Mathematical Statistics (Addison Wesley)
4.	Silvey, S. D. (1975) Statistical Inference (Chapman and Hall)
5.	Wilks, S. S. (1962) Mathematical Statistics (John Wiley)
6.	Lehmann, E. L. (1986) Testing of Statistical hypothesis (John Wiley)
7.	Lehmann, E. L. (1988) Theory of Point Estimation (John Wiley)
8.	Rohatgi, V. K. (1976) Introduction to theory of probability and Mathematical Statistics (John Wiley & Sons)
9.	Michael J. Panik (2012). Statistical Inference :A Short Course , John Wiley & Sons, Inc., New
10.	Nitis Mukhopadhyay (2000). Probability and Statistical Inference, CRC Press

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