MASTER OF SCIENCE IN APPLIED STATISTICS
M. Sc. Applied Statistics, Semester – II

Course Code	PS02CAST51	Title of the Course	PARAMETRIC INFERENCE AND NONPARAMETRIC INFERENCE
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	1. To know data summarization and construction of estimators with desirable properties. 2. To learn classical and Bayesian approaches of estimation. 3. To known various estimation techniques. 4. To known fundamental theories of various approaches for construction of confidence sets and testing of parametric and non-parametric hypotheses Applications of these methods to various distributions.

Course Content

Unit	Description	Weightage* (%)
1.	Point Estimation: unbiased, consistency, efficiency and sufficiency, minimal sufficiency, completeness.(discussion of methods without proofs.) Examples related to well-known discrete and continuous distributions. Information function and Information matrix(Computation for well-known distributions). C-R-Lower-Bound: regularity conditions, Uniformly Minimum Variance Unbiased Estimation; Least Square Estimator, Moment Estimators, Maximum Likelihood Estimators	25
2.	Basic Concepts of testing Of hypothesis; Most powerful tests – Neymann-Pearson Lemma and its applications, Uniformly most powerful tests, Uniformly Most Powerful Unbiased Tests. Invariant tests, Maximum Likelihood Tests, Sequential Probability Ratio Tests.	25
3.	Tests of Randomness, Goodness of fit tests – Chi-Squared and K-S test, Sign Test, Signed Rank Test, Wicoxon Rank Sum Test, Wilcoxon-Mann-Whitney Test, Paired Rank Test, Normal Score Tests, Mood's Test, Locally Most Powerful Rank Tests.	25
4.	Several Sample Tests: Kruskal-Wallis Test,. Distribution-Free Test for Ordered Alternatives (Jonckheere, Terpstra), Distribution-Free Tests for Umbrella Alternatives (Mack-Wolfe), A Distribution-Free Test for General Alternatives in a Randomized Complete Block Design (Friedman, Kendall-Babington Smith), A Distribution-Free Test for General Alternatives in a Randomized Balanced Incomplete Block Design (BIBD) (Durbin, Skillings-Mack)	25

Teaching-Learning	Interactive Class Lectures with live exercises and demonstrations.

Methodology	

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	understand the notion of a parametric models, point and interval estimation of the parameters of those models.
2.	obtain the sufficient statistic, minimal sufficient statistic, MVUE, UMVUE, MLE, moment estimator of the parameter. Consistency and asymptotic normality of MLEs.
3.	formulate null and alternative hypotheses and apply small, large sample and non-parametric tests in real life problems.
4.	understand probabilities of types of error, MP tests, UMP and UMPU test.
5.	know confidence interval of a parameter and its relation with testing of hypothesis problem.
6.	testing of hypothesis using Non-Parametric tests like Median test, Runs test, U test, Kruskal Wallis test etc. and ability to use them judiciously for the testing of given data.

Suggested References:	
Sr. No.	References
1.	Rohatgi V. K. and Saleh, A.K. Md. E. (2009) *An Introduction to Probability and Statistics*, 2nd Edition (Reprint), John Wiley and Sons.
2.	Dudewicz, E. J., and Mishra, S. N. (1988): *Modern Mathematical Statistics*, John Wiley & Sons.
3.	Manoj Kumar Srivastava and Namita Srivastava(2009). *Statistical Inference: Testing of Hypotheses*, Prentice Hall India.

4.	Gibbons, J. D. and Subhabrata Chakraborti (2010) *Nonparametric Statistical Inference*, Fifth Edition, Chapman and Hall/CRC.

On-line resources to be used if available as reference material
On-line Resources

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