

Hard Core	STH502: TESTING OF HYPOTHESES	No. of credits: 4
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Course Outcomes:

CO1: To learn the basics of testing of hypothesis and understand MP and UMP tests.

CO2: To learn Non-existence of UMP test and unbiased test

CO3: To learn to construct confidence intervals for population parameters based on various statistical methods.

CO4: To understand LRT test and large sample tests.

CO5: To familiarize the concepts of non parametric tests

Unit I

Framing of null hypothesis, critical region, test functions, two kinds of error, size of a test, p-value, power function, level of a test. Randomized and non-randomised tests, most powerful tests in class of size α - test, Neyman-Pearson lemma, MP test for simple null against simple alternative hypothesis. Distributions with monotone likelihood ratio, UMP tests for one sided null against one sided alternatives,. Extension of these results in Pitman family when only upper or lower end points depend on the parameter. (14 hrs)

Unit II

Non-existence of UMP test for simple null against two sided alternatives in one parameter exponential family. Neyman-Pearson generalized lemma. Unbiasedness for hypothesis testing – concept with application to one parameter exponential family. (10 hrs)

Unit III

Interval estimation, confidence level, construction of confidence intervals by inverting a test statistic and using pivots. Shortest expected length confidence interval, evaluating interval estimators using size and coverage probability and test-related optimality. Uniformly most accurate one-sided confidence interval and its relation to UMP test for one sided null against one sided alternative hypothesis. (12 hrs)

Unit IV

Likelihood Ratio Test (LRT), Asymptotic distribution of LRT statistic, Pearson's chi-square test for goodness of fit, Bartlett's Test for homogeneity of variances. Large Sample Tests – Wald and Score tests. (10 hrs)

Unit V

Non parametric Tests: One sample test: Test based on total number of runs, the ordinary sign test, the Wilcoxon signed - rank test, the Kolmogorov-Smirnov one sample goodness of fit test. Two-sample tests: Sign test, Wilcoxon signed rank test, the median test, the Wilcoxon-Mann-Whetney test, the Kolmogorov Smirnov two sample test. (10 hrs)

References:

1. Casella G. and Berger R.L. (2002): Statistical Inference, Wadsworth Grou.
2. Gibbons J.D. (1971): Nonparametric Inference, McGraw-Hill.
3. Kale B.K. (1999): A First Course on Parametric Inference, Narosa Publishing House.
4. Kendall M.G. and Stuart A. (1968): The Advanced Theory of Statistics, Vol.II, Charles Griffin and Co.
5. Lehmann E.L. (1986): Testing Statistical Hypotheses, John Wiley.
6. Pratt T.W. and Gibbons, J.D. (1981): Concepts of Nonparametric Theory, Springer.
7. Rao C.R. (1973): Linear Statistical Inference and Its Applications, Wiley Eastern.
8. Silvey S.D. (1970): Statistical Inference, Chapman & Hall.

