

Semester	SEVEN
Course	Minor
Paper Code	B4ST230712T/B4ST230712P
Paper Title	Statistical Inference
No. of Credits	4
Theory / Practical /Composite	Composite
Classes per week	3 Theory and 2 Practical
Module	1

Course Outcomes

1. Remember the basic definitions and terms in statistical inference
2. Understand the concepts of unbiasedness and consistency as well as the principles of the different methods of estimation
3. Apply the different methods of estimation and testing of hypothesis for inferential purposes
4. Analyze real life situations with tools of inference
5. Evaluate the optimality of estimators and tests.
6. Create self-designed projects to be tackled with the methods learnt.

Syllabus

Unit/Module	Content	No. of lectures	CO mapping	Cognitive levels
Unit 1	Point Estimation: Estimator and Mean Squared Error. Unbiasedness and Minimum Variance. Consistency. Sufficient conditions for consistency (statement only). Methods of Estimation : Method of Moments and Method of Maximum Likelihood.	12	CO1 CO2	K1 K2
Unit 2	Testing of Hypotheses: Null and Alternative Hypotheses. Simple and Composite Hypotheses. Test Statistic and Critical Region. Type I and Type II errors. Level of significance and size. Power of a test. p-value. Tests for mean and variance of a normal population. Tests for difference of	12	CO1 CO2 CO3	K1 K2 K3

	means and ratio of variances of two independent normal populations. Tests for correlation coefficient, difference of means and ratio of variances of a bivariate normal population.			
Unit 3	Large Sample Tests: Tests for a single and two independent binomial proportions. Pearsonian χ^2 and its uses in goodness of fit (parameters specified and unspecified), test of independence and test of homogeneity in contingency tables.	8	CO4 CO5 CO6	K4 K5 K6
Unit 4	Interval Estimation: Confidence interval and confidence coefficient. Confidence interval for mean and variance of a normal population and difference of means and ratio of variances of two independent normal populations. Approximate confidence interval for single and two independent binomial proportions. Confidence interval for difference of means of a bivariate normal population.	7	CO4 CO5 CO6	K4 K5 K6

List of practical

1. Methods of Estimation
2. Confidence interval for the parameters of a normal distribution (one sample and two sample problems)
3. Tests of hypotheses for the parameters of a normal distribution (one sample and two sample problems)
4. Approximate tests for binomial proportion(s) and related confidence interval
5. Tests for goodness of fit, independence and homogeneity using Pearsonian chi-square statistic

Reading/Reference list

1. Goon, A.M. Gupta, M.K. and Dasgupta, B. (2003): An outline of Statistical Theory, Vol. 2, 4th Edn. World Press, Kolkata.
2. Rohatgi V.K. and Saleh, A. K. Md, E. (2009): An Introduction to Probability and Statistics, 2nd edition (Reprint), John Wiley and Sons.
3. Hogg, R.V. and Tanis, E.A. (2009): A Brief Course in Mathematical Statistics. Pearson Education.

Evaluation

	Theory CIA: 15 Semester Exam: 45	Practical : 40 Continuous assessment
Paper structure for semester exam	Short Questions (5 marks each) 3 out of 5	Long Questions (15 marks each) 2 out of 3

CO	CO Description	Cognitive levels
CO1	Remember the basic definitions and terms in statistical inference	K1
CO2	Understand the concepts of unbiasedness and consistency as well as the principles of the different methods of estimation	K2
CO3	Apply the different methods of estimation and testing of hypothesis for inferential purposes	K3
CO4	Analyze real life situations with tools of inference	K4
CO5	Evaluate the optimality of estimators and tests.	K5
CO6	Create self designed projects to be tackled with the methods learnt.	K6