Semester	**FOUR**
Course	**Major**
Paper Code	**C2ST230421T**
Paper Title	**Statistical Inference I**
No. of Credits	**4**
Theory / Practical /Composite	**Theory**
Classes per week	**4**
Module	**1**

Course Outcome

1.**Remember** the basic ideas and definitions of Statistical Inference
2.**Understand** the basic differences among the different branches of Statistical Inference
3. **Apply** the methods of generation of estimators and testing statistical hypotheses
4. **Analyze** problems using estimation and tests
5.**Evaluate** the performance of the different estimators and tests through judgement criteria
6.**Create** self designed inferential problems from real world data

Syllabus

Unit/Module	Content	No. of lectures	CO mapping	Cognitive levels
Unit 1	***Introduction:*** Types of Inference. Estimation and Testing of hypothesis. Point Estimation and Interval Estimation. Concepts of parameter and statistic**.**	4	CO1 CO2	K1 K2
	Point Estimation**:** Estimator, unbiasedness and mean square error. Choice of best estimator. Estimation by method of moments.	8	CO3 CO4 CO5 CO6	K3 K4 K5 K6
	Testing of hypothesis**:** Simple and composite hypotheses, null and alternative hypotheses, level of significance and size of a test, probabilities of Type I and Type II errors, critical region, p-value.	8	CO3 CO4 CO5 CO6	K3 K4 K5 K6

Unit 2	***Interval Estimation*:** Length of confidence intervals and confidence coefficient. Pivotal technique of finding confidence intervals. Confidence intervals for mean and variance of a univariate normal distribution. Confidence intervals for difference of means and ratio of variances of two independent normal distributions & a bivariate normal distribution. Confidence intervals for correlation and regression coefficients.	8	CO3 CO4 CO5 CO6	K3 K4 K5 K6
Unit 3	***Tests of significance related to normal distribution:*** Tests for mean and variance of a univariate normal distribution. Tests related to means and variances of two independent normal distributions. Tests related to means and variances of bivariate normal distribution. Test related to correlation coefficient (null case) of a bivariate normal distribution. Tests for regression coefficients.	16	CO3 CO4 CO5 CO6	K3 K4 K5 K6
	***Tests of significance related to discrete distributions*:**Test related to single Binomial proportion and Poisson mean. Test related to equality of binomial proportions and Poisson means.	8	CO3 CO4 CO5 CO6	K3 K4 K5 K6

Reading/Reference list

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

4. Hogg, R.V. and Tanis, E.A. (2009): A Brief Course in Mathematical Statistics. Pearson Education.
5. Johnson, R.A. and Bhattacharya, G.K. (2001): Introduction to the theory of Statistics, 3rd edition (Reprint). Tata McGraw-Hill Pub. Co. Ltd.
6. Casella, G. & Berger, R.L. (2021): Statistical Inference. Cengage Learning.

Evaluation

	CIA: 30 End-Sem: 70 Total: 100	
Paper Structure for End Semester	Short questions (5 marks each)	Long questions (15 marks each)
	5 out of 7	3 out of 5

CO	CO Description	Cognitive levels
CO1	**Remember** the basic ideas and definitions of Statistical Inference	K1
CO2	**Understand** the basic differences among the different branches of Statistical Inference	K2
CO3	**Apply** the methods of generation of estimators and testing statistical hypotheses	K3
CO4	**Analyze** problems using estimation and tests	K4
CO5	**Evaluate** the performance of the different estimators and tests through judgement criteria	K5
CO6	**Create** self-designed inferential problems from real world data	K6