Course Code	MTH			
Course Name	Statistical Inference			
Credits	4			
Course Offered to	UG/PG			
Course Description	The course introduces the theoretical concepts and derivations of parametric and non parametric statistical inference. It also gives a brief introduction to building statistical linear models and analyze them. The course includes estimation, hypothesis testing, confidence interval and an introduction to Linear Regression and ANOVA. The students will learn derivations, simulations, and analysis of the real data.			
Pre-requisites		**Anti-requisite**		
Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Statistical Signal Processing	Statistical Computation	Econometrics I
Probability and Statistics				
*Please insert more rows if required				

Post Conditions*(For suggestions on verbs please refer the second sheet)				
CO1	**CO2**	**CO3**	**CO4**	**CO5**
Students will learn the concepts of finding best statistic and estimation. They will be able to apply commonly used parametric estimation techniques.	Students will be able to test the hypothesis and construct confidence intervals for a known probability distributions.	Students will also be able to test the hypothesis when the distribution is unknown and when the data is categorical.	Students will be able to build codes in R (or equivalent) to perform inferences and build simple statistical models	Students will be able to build and analyze simple statistical models. They will be able to apply the methods on real life data.

Weekly Lecture Plan				
Week Number	**Lecture Topic**	**COs Met**	**Assignment/Labs/Tutorial**	
Week 1, 2	Principles of data reduction: Sufficient, minimal and complete statistics; Likelihood and Invariance principles	CO1	Assignment 1 : On data reduction techniques	
Week 3, 4, 5	Method of Point Estimation: Moments, maximum likelihood, expectation minimization; Methods of evaluating estimators: mean squared error, unbiasedness, sufficiency, consistency	CO1, CO4	Assignment 2 : On estimation methods	
Week 5, 6, 7	Hypothesis Testing : Likelihood ratio test, invariant tests, Error probabilities, power function, most powerful tests	CO2, CO4	Assignment 3 : Building hypothesis and test for real life examples. Calculate their error probabilities and find power.	
Weeks 7, 8	Interval Estimation : inverting a test statistics, pivotal quantities, invariant intervals, evaluating interval estimation (time permitting)	C02, CO4	Assignment 4 : Theoretical on interval estimation for real life examples.	
Weeks 9, 10, 11	Random sample: sum of random sample, sample mean and properties of sample mean and variance, Student's t and F distribution; derivation of the hypothesis tests	CO3, C04	Assignment 5, 6: Building hypothesis and test for real life examples.	
Weeks 12, 13	Other topics : Linear regression; Analysis of Variance	CO4, CO5	Assignment 7, 8: One assignment on Regression and another on ANOVA. It will involve building models and analyzing the real life data	

*Please insert more rows if required

Weekly Lab Plan

Week Number	Laboratory Exercise	COs Met	Platform (Hardware/Software)

*Please insert more rows if required

Assessment Plan

Type of Evaluation	% Contribution in Grade
Assignment	20
Quiz	25
Mid-sem	25
End-sem	30

*Please insert more row for other type of Evaluation

Resource Material

Type	Title
Textbook	Introduction to Mathematical Statistics, by Robert V. Hogg and Allen T Craig
Textbook	An Introduction to Probability and Statistics by Vijay K. Rohatgi and A.K. Md Ehsanes Saleh (2nd Edition)
Reference	Statistical Inference, Second edition, by George Casella and Roger L Berger