**MA\*721 Theory and Methods of Statistical Inference**

Parametric models, parameters, random sample and its likelihood, statistic and Its sampling distributions, problems of inference. Examples from standard discrete and continuous models such as Bernoulli, Binomial, Poisson, Negative Binomial, Normal, Exponential, Gamma, Weibull, Pareto etc. Concept of sufficiency, minimal sufficiency, Neyman factorization criterion, Fisher information, exponential families. Maximum likelihood estimators, method of moment estimators, percentile estimators, least squares estimators, minimum mean squares estimators, uniformly minimum variance unbiased estimators, Rao- Blackwell theorem, Cramer-Rao lower bond, different examples. Statistical Hyptheses-simple and composite, statistical tests, critical regions, Type-I and Type- II errors, size and power of a test, Neyman Pearson lemma and its different applications. Most powerful test,

uniformly most powerful test, unbiased test and uniformly most unbiased test. Likelihood ratio test. Interval estimation, confidence intervals, construction of confidence intervals, shortest expected length confidence interval, most accurate one sided confidence interval and its relation to UMP test.

**References:**

1. Barndorff-Nielsen, O.E. and Cox, D.R. Inference and Asymptotics. Chapman and Hall, London, 1994
2. Casella, G. and Berger, R.L. Statistical Inference. Wadsworth publishing Co., Belmont, CA, 2002
3. Cox, D.R. Principles of Statistical Inference. Cambridge University Press, Cambridge, 2006
4. R.J.Freund, W.J. Wilson and D.L Mohr, Statistical Methods, , (Ed 3) Elsevier, 2010