DEPARTMENT OF STATISTICS

M. Phil Statistics

M. Phil PROGRAMME

REVISED SYLLABUS

Loyola College (Autonomous)

Chennai- 600 034

ST 1117 ADVANCED STATISTICAL INFERENCE

Semester 1 Credits 6

Category: Major Core(MC) Hours/Week:6

Objective: To provide strong foundation in statistical inference with recent trends.

Unit 1: Unbiased estimation- Problem of Point estimation- Simultaneous unbiased estimation – Convex loss function, Rao-Blackwell theorem, Lehmann-Scheffe theorem – Optimality criteria –Q,T,D and M criteria and their equivalence- Examples.

Unit 2: Equivariant estimation- Principles of invariance and equivariance –Estimation of parameter(s) in location, scale and location –scale models-Estimation of percentiles in location-scale models-Examples.

Unit 3: Optimal tests-Monotone Likelihood Ratio-Generalised Neyman-Pearson theorem-Uniformly Most Powerful(UMP) and UMP unbiased tests for one-parameterexponential family-Similar tests and Neyman structure-Multiparameter exponential family-Conditional and unconditional tests-UMA confidence bounds-Examples.

Unit 4: Locally optimal and Asymptotic tests-Invariant tests-Locally optimal tests-Asymptotic properties of Likelihood ratio tests- Large sample Chi-Square tests.

Unit 5: Order statistics and inference –Inference based on order statistics-Order statistics from life testing experiments-Types of censoring: Type I, Type II and progressive censoring schemes- Estimation based on censored observations from exponential distribution.

Books for Study and Reference

1. Arnold, B.C, Balakrishnan, N. and Nagaraja,H.N – A first course on order statistics, John Wiley and Sons,N.Y., 1992
2. Balakrishnan,N and Aggarwala,R. – Progressive censoring: Theory and Methods. Birkhauser, Boston., 2000
3. Casella,G. and Berger,R.L- Statistical Inference, Pacific Grove, Wadsworth,C.A., 1990
4. David –Order statistics. John Wiley and sons,N.Y., 1982
5. Kale,B.K.-A first course on parametric inference. Narosa Publishing House., 2005
6. Lawless,J.F. –Statistical Models and Methods for lifetime data. John Wiley and Spons,NY., 1982
7. Lehmann, E.L. and Casella,G –Theory of Point Estimation, Springer-Verlag, NY., 1988
8. Lehmann,E.L-Testing Statistical Hypotheses, John Wiley and Sons, New York., 1986
9. Rao,C.R – Linear statistical inference and its applications. Wiley Eastern Limited., 1973
10. Rohatgi,V.K and Saleh, A.K.Md.E- An Introduction to probability and Statistics. John Wiley and Sons, N.Y., 2002

ST 1120: STOCHASTIC MODELING

Semester 1 Credits 6

Category: Major Core(MC) Hours/Week:6

Objective: To lay strong foundation in Applied Probability and give an exposure to its applications.

Unit 1: Markov Chains and Markov processes- Martingales: Definitions and examples-Super Martingales and Sub Martingales.

Unit 2: Renewal Processes: Definition of Renewal Process and related concepts –Some examples of Renewal Processes- Special Renewal Processes- Poisson Process viewed as a Renewal Process- Replacement Models-Renewal equations and the elementary Renewal Theorem- The renewal Theorem.

Unit 3: Branching Processes: Discrete time Branching Processes- Generating function relations for Branching Processes- Extinction Probabilities – Continuous time Branching Processes- Extinction Probabilities for continuous time Branching processes.

Unit 4: Queuing Models: Queues with Combined Arrivals and Departures- Queues with Priorities for Service –Tandem or Series Queues – Analysis of Queues by Imbedded Markov Chains- All derivations included.

Unit 5: Simulation: Design Implementation-examples- Different Methods of generating random numbers- Congruential- Mixed-Multiplicative- Quadratic Congruential method-testing Procedures. Known distributions – generation of random numbers.

Books for study and Reference

1. Chow.Y.S. and Teicher,H –ProbabiltyTheory:Independence, Interchangeability, Martingales, Springer –Verlag, NY., 1988
2. Karlin,S and Taylor,H.M.-A First course on Stochastic Processes, Academic Press., 1975
3. Ravindran,A. Philips,D.T and Solberg,J.J.- Operations Research – Princples and Practice. John Wiley and sons., 2004
4. Ross,S.M. –Stochastic Processes. John Wiley and sons NY., 2004
5. Taha,H. – Operations Research –An Introduction(Fourth Edition), Macmilan Publishing Company., 1987.