Mahatma Gandhi University, Kottayam

Ph.D. Course work in Statistics

Course II – Modern Trends in Statistics

Unit 1. Mathematical Techniques for Statistics: Review of sequences and series, Convergence, Continuity, Uniform continuity, Differentiability, Laplace Transform, Vector spaces, Independence of vectors, Basis of a vector space. Different type of matrices, Different type of quadratic forms and their properties, Eigen-values and Eigen-vectors, Spectral decomposition of matrices, Linear transformations.

Unit 2. Probability and Limit Theorems: Probability Space, Bayes' theorem, Random variables and distribution function, Standard continuous and discrete distributions and their inter-relationships. Characteristic functions and their properties, Sequences of random variables and various types of convergences, Laws of large numbers, Central limit theorems and applications.

Unit 3. Statistical Inference: Properties of estimates**, S**ufficiency, Minimal sufficiency and completeness, Minimum variance bound estimator, Rao-Blackwell and Lehmann-Scheffe theorems, Moment estimation, Maximum likelihood estimation of parameters, Neyman- Pearson theory of testing of hypotheses, Uniformly most powerful test, Unbiased test, Construction of UMPU test.

Unit 4. Multivariate Analysis: Important properties of multivariate normal and multinomial distributions. Maximum likelihood estimation, Hotelling's T^2 statistic (one sample and two samples) and applications. Data reduction methods. Principal Component analysis, Canonical correlation and Discriminant analysis.

REFERENCES AND TEXT BOOKS

1. Rohatgi, V.K. and Saleh , A. K. Md. E. (2001). An Introduction to Probability Theory and
   Mathematical Statistics, 2nd Edition, Wiley Eastern, New Delhi.

2. Lehmann, E.L. and Casella, G. (1998). Theory of Point Estimation, 2nd Edition John Wiley, NewYork.

3. Rao, C.R. (2002). Linear Statistical Inference and its Applications, 2nd Edition Wiley Eastern, New Delhi.

4. Lehmann, E.L. (1986). Testing Statistical Hypotheses, 2nd Edition, John Wiley and Sons.

5. Saber, G.A.F (2004). Multivariate Observations, John Wiley