ಮೈಸೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ

University of Mysore

(Estd.1916)

Ph.D in STATISTICS

UNIVERSITY OF MYSORE
Department of Studies in Statistics
Manasagangotri, Mysuru-570 006

Regulations and Syllabus
Ph.D. in STATISTICS

CHAIRMAN
DEPT OF STATISTICS
MANASAGANGOTRI
UNIVERSITY OF MYSORE
MYSORE 570 006 INDIA

UNIVERSITY OF MYSORE

GUIDELINES AND REGULATIONS LEADING TO

PH.D. IN STATISTICS

Programme Details

Name of the Department	:	Department of Studies in Statistics
Subject	:	Statistics
Faculty	:	Science and Technology
Name of the Programme	:	Ph.D.

SYLLABUS FOR Ph.D. COURSE WORK

PROGRAMME OUTCOMES

This course enables the students to get mastery over

- Probability Theory, Mathematical Statistics and Statistical Inference
- Statistics to some advanced topics which may help in the research work of the student.

COURSE 1: ADVANCED RESEARCH METHODOLOGY

Course Outcomes:

A person successfully completing the Course will be exposed to

- advanced concepts in probability theory and mathematical statistics useful for pursuing research in statistics.

Pedagogy:

The course is taught using chalk-and-talk method and many topics are for self study by the students. Students are encouraged to use text and video resources available on the web.

Course Content

Unit –I :

Chapter 6 in Athreya and Lahiri (2006): Central Limit Theorems – Lindeberg-Feller theorems; Stable distributions; Infinitely divisible distributions, Refinements and extensions of the CLT – The Berry-Esseen theorem, Edgeworth expansions, Large deviations, The functional central limit theorem, Empirical process and Brownian bridge; Problems. Chapter 11 in Athreya and Lahiri (2006): Limit Theorems for Dependent Processes – Mixing sequences – Mixing coefficients, Coupling and covariance inequalities; Central limit theorems for mixing sequences; Problems.

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Unit –II :

Chapter 1 in Joe (1997): Conditions for multivariate distribution functions – Properties of a bivariate cdf F, Properties of a multivariate cdf F; Types of dependence;

Copulas. Chapter 2 in Joe (1997): Basic Concepts of Dependence – Dependence properties and measures – Positive quadrant and orthant dependence, Stochastic increasing positive dependence, Right-tail increasing and left-tail decreasing, Associated random variables, Total positivity of order 2, Positive function dependence, Relationships among dependence properties, Max-infinite and min-infinite divisibility, Kendall's tau and Spearman's rho, Tail dependence, Examples; Dependence orderings – Concordance ordering, Axioms for a bivariate dependence ordering, Axioms for a multivariate dependence ordering, More SI bivariate orderings, More TP_2 bivariate orderings, Positive function dependence ordering, Examples: bivariate, Examples: multivariate; Exercises; Unsolved problems.

Unit –III :

Chapter 10 Brownian Motion and Stationary Processes in Ross (2000): Brownian Motion; Hitting Times, Maximum Variable, and the Gambler's Ruin Problem; Variations on Brownian Motion – Brownian Motion with Drift, Geometric Brownian Motion; Pricing Stock Options – An Example in Options Pricing, The Arbitrage Theorem, The Black-Scholes Option Pricing Formula; White Noise; Gaussian Processes; Stationary and Weakly Stationary Processes; Harmonic Analysis of Weakly Stationary Processes; Exercises.

Unit –IV :

Chapter 3 Randles and Wolfe (1979): U-Statistics – One-sample U-Statistics; Some Convergence Results; The Projection Principle and the One-Sample U-Statistic Theorem; Two-Sample U-Statistics. Chapter 5 in Randles and Wolfe (1979): Asymptotic Relative Efficiency of Tests – Pitman Asymptotic Relative Efficiency; Methods for Evaluating ARE(S,T) – Noether's Theorem; Extended U-Statistics Theorems; Examples of Pitman's ARE for Translation Alternatives; Discussion – Deficiency and Bahadur Efficiency. Chapter 8 in Randles and Wolfe (1979): Linear Rank Statistics under the Null Hypothesis – Linear Rank Statistics; Distributional Properties; Some Preliminaries for Asymptotics; Asymptotic Normality under H_0. Chapter 9 in Randles and Wolfe (1979): Two-Sample Location and Scale Problems – The Two-Sample Location Problem; Asymptotic Properties in the Location Problem; The Two-Sample Scale Problem.

Unit –V :

Chapter 12 in Athreya and Lahiri (2006): The Bootstrap – The bootstrap method for independent variables – A description of the bootstrap method, Validity of the bootstrap: Sample mean, Second order coorectness of the bootstrap, Bootstrap for lattice distributions, Bootstrap for heavy tailed random variables. Chapter 11 in Ross (2000): Simulation – General Techniques for Simulating Continuous Random Variables – The Inverse Transformation Method, The Rejection Method, The Hazard Rate Method; Special Techniques for Simulating Continuous Random Variables – The

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Normal Distribution, The Gamma Distribution, The Chi-Squared Distribution, The Beta (n, m) Distribution, The Exponential Distribution – The von Neumann Algorithm; Simulating from Discrete Distributions – The Alias Method; Stochastic Processes – Simulating a Nonhomogeneous Poisson Process, Simulating a Two-Dimensional Poisson Process; Variance Reduction Techniques – Use of Antithetic Variables, Variance Reduction by Conditioning, Control Variates, Importance Sampling; Determining the Number of Runs; Exercises. R software and LaTeX typesetting program.

References:

1. Athreya, K.B. and Lahiri, S.N. (2006) : Probability Theory, TRIM 41, Hindustan Book Agency.
2. Joe, H. (1997) : Multivariate Models and Dependence Concepts. Chapman and Hall.
3. Randles, R.H. And Wolfe, D.A. (1979) : Introduction to the Theory of Nonparametric Statistics, John Wiley and Sons.
4. Ross, S.M. (2000) : Introduction to Probability Models, Sixth Edition, Harcourt Asia Pvt. Ltd., Academic Press.

COURSE 2: DISCIPLINE CENTRIC SURVEY

Course Outcomes

- Make an extensive survey of literature using different sources of published works from the similar lines and they need to find the research gaps.
- Identify the broad area for research and form the proposal by justifying the need and relevance of the topic.
- Formulate the research problem based on the review and finding the research gaps present a seminar on review of literature of the concerned area of research.

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