

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

B. S. Srinivas
CHAIRMAN
DEPT OF STATISTICS
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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 TP₂ 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 correctness 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

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.

BBB

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