

2023-24

Department of Mathematics and Statistics

School of Mathematical and Physical
Science



अध्यक्ष / Chairman
बोर्ड ऑफ स्टडीस् (बी. ओ. एस.)
Board of Studies (BOS)
गणित एवं सांख्यिकी विभाग
Department of Mathematics and Statistics
डॉ. हरिसिंह गौर विश्वविद्यालय, सागर
Dr. H.S. Gour Vishwavidyalaya, Sagar

Syllabus of Ph.D. (Statistics) Entrance Test

Session 2023-24 onward

Date of BoS -12/12/2023

Doctor Harisingh Gour Vishwavidyalaya
(A Central University)

Sagar-Madhya Pradesh-470003

DShweta
12/12/23
Chairman, BOS

Passed by Board of Studies Dated...12/12/23

Passed by School Board Dated...13/12/23

Ph.D. (Statistics) Entrance Syllabus from Session 2023 onwards
Dr. Harisingh Gour Central University, Sagar (M.P)

Part A: Research Methodology

1. Foundations of Research

Meaning, Objectives, Motivation, Utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific method - Understanding the language of research - Concept, Construct, Definition, Variable. Research Process

2. Problem Identification & Formulation

Research Question - Investigation Question - Measurement Issues - Hypothesis - Qualities of a good Hypothesis - Null Hypothesis & Alternative Hypothesis. Hypothesis Testing.

3. Research Design

Concept and Importance in Research - Features of a good research design Exploratory Research Design - concept, types and uses, Descriptive Research Designs - concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.

4. Qualitative and Quantitative Research

Qualitative research - Quantitative research - Concept of measurement, causality, generalization, replication. Merging the two approaches.

5. Awareness with MS-Word, file operations, text editing operations, various table designs, insertion of tables in text, use of mathematical symbols and equation editor, use page layout and Working practice with MS-Word, Awareness with MS Excel, worksheet creation, Computations using worksheet, Use of mathematical and statistical functions, Awareness about working practice with MS-Excel.

Part B: Statistics

1. Probability Theory

Sample space, discrete probability, independent events, Bayes theorem. Random variables and distribution functions; expectation and moments. Independent random variables, marginal and conditional distributions.

2. Stochastic Processes

Markov chains with finite and countable state space, classification of states, limiting behaviour of n-step transition probabilities, stationary distribution, Poisson and birth-and-death processes.

3. Probability Distribution

Standard discrete and continuous univariate distributions. sampling distributions, standard errors and asymptotic distributions, distribution of order statistics and range.

4. Statistical Inference

Methods of estimation, properties of estimators, confidence intervals. Tests of hypotheses: most powerful and uniformly most powerful tests, likelihood ratio tests. Analysis of discrete data and chi-square test of goodness of fit. Large sample tests.

Simple nonparametric tests for one and two sample problems, rank correlation and test for independence.

5. Linear Models

Gauss-Markov models, estimability of parameters, best linear unbiased estimators, confidence intervals, tests for linear hypotheses. Analysis of variance and covariance. Fixed, random and mixed effects models. linear regression.

6. Multivariate Analysis

Multivariate normal distribution, Wishart distribution and their properties. Distribution of quadratic forms.

7. Sampling Survey

Simple random sampling, stratified sampling and systematic sampling. Probability proportional to size sampling. Ratio and regression methods.

Dr. H.S. Gour Vishwavidyalaya, Sagar, M.P.
 Department of Mathematics and Statistics
 डॉ. हरीशंकर गौर विश्वविद्यालय, सागर, म.प्र.
 गणित एवं सांख्यिकी विभाग
 बोर्ड ऑफ स्टडीज (बी. अ. ए.)
 बोर्ड ऑफ स्टडीज (BOS)
 अध्यक्ष / Chairman

DS Muk19
12/12/23

Prj

12/12/23

12.12.23

12.12.23

12.12.23

Passed by Board of Studies Dated 12/12/23

Passed by School Board Dated 13/12/23

8. Design of experiments

Completely randomized designs, randomized block designs and Latin-square designs. Connectedness and orthogonality of block designs.

9. Operational Research

Linear programming problem, simplex methods, duality. Elementary queuing and inventory models.

12/12/23

RL

12/12/23

12/12/23

12/12/23

DS huclo
12/12/23

12/12/23

12/12/23

Passed by Board of Studies Dated 12/12/23

Passed by School Board Dated 12/12/23

अध्यक्ष / Chairman
बोर्ड ऑफ स्टडीज (बी. ओ. एस.)
Board of Studies (BOS)
गणित एवं सांख्यिकी विभाग

Department of Mathematics and Statistics
डॉ. हरीसिंह गौर विश्वविद्यालय, सागर म.प्र.
Dr. H.S. Gour Vishwavidyalaya, Sagar, M.P.