

SYLLABUS OF COURSE WORK
of
DOCTOR OF PHILOSOPHY
Prepared by
Department of Statistics
(Faculty of Science)
University of Lucknow,
Lucknow -226 007



Important points to be noted:

- ❖ Duration of Course Work : One Semester (6 Months)
- ❖ Total Marks : 200 (Two papers 100 marks each)
- ❖ Duration of Examination: 4 Hrs. (2 Hrs. for each paper)
- **Paper I: Research Methodology & Review of Research Work: 100 Marks (2 hrs)** (a) Research Methodology: 50 Marks (b) Review of Research Work: 50 Marks
- **Paper II : Subject Course Work: 100 Marks (2 hrs.)**
- Examination will be held at the end of the Semester.
- Total Lecture Hour (periods) for Paper I: 40
- Total Lecture Hour (periods) for Paper II: 40

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Annexure-1 (Ph.D. Course Work, Statistics)
PAPER I: Research Methodology

Unit I

Definition of problem: Necessity of defining problem, Technique involved in defining a problem. Surveying the available literature. Techniques involved in solving the problem: Different methods used to solve a problem.
Research Design: Subject of study; Place of study; Reason of such study; Type of data required; Method of data collection; Periods of study; Style of data presentation.

Unit II

Developing a research plan: Research objective; Information required for solving the problem; each major concept should be defined in operational terms; An overall description of the approach should be given and assumption if considered should be clearly mentioned in research plan; The details of techniques to be adopted. *Review of Research Work*: The relevance of the research work from the perspective of the subject - Possible ways to apply the research work in future.

Unit III

Computer: Basic of Computer Operating System: Using Windows - Directory structures - command structure (Document preparation, EXCEL, Power Point Presentation). Word Processing: Basics of Editing and Word processing. Numerical analysis. Figure Plotting: Figure insertions in documents. Web Browsing for Research: Usage of Webs as a tool for scientific literature survey.

Unit IV

Concept of Research in Statistics-Importance and Need for Research Ethics, Selection of Topic for Research-Research schedules, Review of Literature and its Use in Designing a Research Work-Mode of Literature Survey-Books and Monographs, Journals, Conference Proceedings, Abstracting and Indexing Journals, E-Journals/Books and CD-ROMS-Reports etc. Thesis Writing - Computer Application in Scientific Research-www-Searching Scientific Articles-Statistical Data Base. History of Statistics. Statistical Heritage of India.

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PAPER II: Subject Course Work

Unit I

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

Unit II

Statistical Inference: Properties of estimates, Sufficiency, 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 III

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, Discriminant analysis, Factor analysis and Cluster analysis.

Unit IV

An Overview of SPSS: Mouse and keyboard processing, frequently used dialog boxes. Editing output Printing results. Creating and editing a data file. Managing Data: Listing cases, replacing missing values, computing new variables, recording variables, exploring data, selecting cases, sorting cases, merging files. Graphs: Creating and editing graphs and charts. Bar chart, histogram and pie chart. Descriptive Statistics: measures of central tendency, variability, deviation from normality, size and stability. Cross-Tabulation and chi-square association. Means Procedure. Bivariate-Correlation, Partial Correlations and the correlation matrix. T-test procedure: Independent -samples, paired samples, and one sample tests The One way analysis of variance. General Linear model: Two -way analysis of variance. General Linear model: three -way analysis of variance and the influence of covariates Simple Linear Regression. Multiple Regression Analysis. Multidimensional scaling. Factor analysis and Cluster analysis.

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