

**PH024**  
**Ph.D. Course Work**  
**RESEARCH METHODOLOGY**

**Unit1: Introduction to research & Literature Survey (10 Lectures)**

- 1.1 Definition and Characteristics of Research
- 1.2 Qualities & Characteristics of Researcher
- 1.3 Types of Research
- 1.4 Classification of Research & Components of Research Process
- 1.5 Identification of research topic.
- 1.6 Review of literature
- 1.7 Ethics in research & Plagarism
- 1.8 Formulating a Research Problem
- 1.9 Familiarity with END NOTE software package

**Unit2: Bioanalytical Techniques (10 Lectures)**

- 2.1 Concepts on Buffers , molarity and ionic strength & Preparation of reagents and cell culture media
- 2.2 Centrifugation techniques: Density gradient centrifugation, Ultracentrifuge, Types of rotors
- 2.3 Electrophoresis, native and denatured PAGE, IEF and 2-D electrophoresis, agarose gel electrophoresis, Gradient electrophoresis.
- 2.4 Spectroscopy: UV & Visible, FTIR, CD and Fluorescence spectroscopy, Microplate reader, Maldi TOF, GCMS
- 2.5 Microscopy: Inverted Microscope, Fluorescence, Phase Contrast and DIC Microscopes. SEM, TEM and Confocal Microscope.

**Unit 3: Statistical Methods (10 Lectures)**

- 5.1 summary statistics
- 5.2 common probability distributions and applications to solve problems based on biological studies
- 5.3 distribution of observations about the mean based on the assumption of normality and apply those calculations to solve problems based on biological data
- 5.4 distribution of sample means about the mean and apply those calculations to solve problems based on biological data
- 5.5 design simple biological experiments
- 5.6 compare two means (from paired and unpaired data) using both parametric and non-parametric methods and use those methods to test hypotheses
- 5.7 analyze categorical data to test both goodness-of-fit and contingency hypotheses
- 5.8 compare more than two means using analysis of variance methods and use those methods to test hypotheses derived from both single-factor and two-factor experimental designs
- 5.9 Least-squares regression lines and applies those calculations to solve problems based on biological studies.

**Unit 4: Research Design, Planning & Technical Writing (10 Lectures)**

- 4.1 Planning and design of experimental work
- 4.2 Data collection and processing methods

- 4.3. Writing an article based on experimental work
- 4.4 Review writing on the topic of research
- 4.5 Preparation of power point presentation
- 4.6 Review of the best research article in the area of candidate's research
- 4.7 Review of the best research review in the area of candidate's research

**Unit 5: Thesis Writing (10 Lectures)**

- 5.1 Design of thesis, Chapters in the thesis
- 5.2 Components of the thesis
- 5.3 Distinction between introduction and review of literature
- 5.4 Distinction between summary and conclusion
- 5.5 Preparation of tables and graphs
- 5.6 Figures and legends
- 5.7 Bibliography – format, citation in the text.

References:

1. Thesis & Assignment Writing–J Anderson, B.H.Dursten & M.Poole, Wiley Eastern, 1977
2. A Hand Book of Methodology of Research – P. Rajammal and P. Devadoss, R. M. M. Vidya Press, 1976.
3. The Craft of Scientific Writing by Michael Alley, (Springer).
4. Research Methodology by R. Panneerselvam, PHI, New Delhi 2005



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**PH014- Research Methods & Report Writing**

**Objective of the Course:**

Objective of the course is to enable research scholars to have a general understanding of research methods and application of statistical tools in the analysis and interpretation of findings and guidelines for report writing.

**UNIT - I**

Introduction: Nature and Importance of research, the role of business research, aims of social research, research process, types of research. Data Base: discussion on primary data and secondary data, probability and non-probability sampling techniques.

**UNIT-II**

Research design: Meaning of research design. Functions and goals of research design. Questionnaire and Schedule.

**UNIT - III**

Measurement and scaling concepts, attitude measurement, levels of measurement and types of scales, criteria for good measurement. Measures of central tendency, measures of dispersion, measures of variation, Correlation and Regression. Statistical Inference. Tests of significance for small samples, t-test, Chi-Square test and ANOVA-one way and two way classifications. discriminate analysis, cluster analysis, conjoint analysis

**UNIT-IV**

**Report Writing:** Pre-writing considerations, Thesis writing, formats of report writing, Formats of publications in Research Journals. Technique of Interpretation, Precaution in Interpretation, Significance of Report writing, Different steps in writing Report, Layout of the Research Report, Types of Reports, Report Format, Typing Instructions, Oral Presentations.

**UNIT-V**

**Research Ethics and Morals:** Issues related to plagiarism, collaborative models and ethics, acknowledgements. *Intellectual Property Rights:* copy rights.

**Text Books:**

1. Bhattacharya, D. K., Research Methodology, Excel Books, New Delhi.
2. Gupta S.P., Statistical Methods, Sultan Chand, New Delhi, 2001.
3. Pannarselvam., Research Methodology, Prentice Hall of India, New Delhi, 2005.

**Reference Books:**

1. Andrews, F.M. and S.B. Withey Social Indicators of well being, Plenum Press, 1976.
2. Bennet, Roger, Management Research, ILO, 1983.
3. Murray.R. How to write a Thesis:, Tata Mc Graw-Hill.
4. Nanda Gopal, Research Methods Using Computers, Excel Books, New Delhi.
5. Salkind. Neil.J., Exploring Research, Prentice Hall of india, New Delhi, 1997.
6. Shajahan.S., Research Methods for Management, Jaico Publishing House, 2005.
7. C.R. Kothari: Research Methodology, Methods & Techniques, 2nd Edition, New Age International Publications

