

**DR. CHANDRAMMA DAYANANDA SAGAR INSTITUTE OF MEDICAL  
EDUCATION AND RESEARCH  
(DAYANANDA SAGAR UNIVERSITY)**

Deverakaggalahalli, Kanakapura Road, Ramnagara Dt., Karnataka – 562 112

**SYLLABUS FOR Ph.D. ENTRANCE EXAMINATIONS  
RESEARCH METHODOLOGY AND BIOSTATISTICS**

**UNIT I – Introduction and Literature Review to Research Methodology:** Definition and importance of research; Types of research: Basic, applied, clinical, epidemiological; Steps in research process; Scientific method and characteristics of good research; Identification of research problem; Formulation of research objectives and hypotheses; Ethical principles in biomedical research (ICMR guidelines, informed consent); Importance and methods of literature review; Use of databases: PubMed, Scopus, Google Scholar; Referencing styles: Vancouver, APA; Use of reference management tools: Zotero, Mendeley; Components of a research protocol and proposal; Setting SMART objectives

**UNIT II - Study Designs Sampling Methods in Medical Research:** Descriptive studies: Case reports, cross-sectional; Analytical studies: Case-control, cohort; Experimental studies: Randomized controlled trials, field trials; Concepts: Randomization, blinding, control groups; Diagnostic test evaluation: Sensitivity, specificity, PPV, NPV, ROC curves; Probability sampling: Simple random, stratified, cluster; Non-probability sampling: Convenience, purposive, snowball; Sample size estimation for: Means, Proportions, Case-control studies, Cohort studies, Clinical trials; Concepts: Power, effect size, margin of error

**UNIT III - Data Collection and Biostatistics:** Designing questionnaires and case report forms; Validity and reliability testing (e.g., Cronbach's alpha); Pilot testing and pretesting; Data coding and entry; Data cleaning and management; Data security and anonymization; Measures of central tendency: Mean, median, mode; Measures of dispersion: Range, SD, IQR; Correlation and Regression; Hypothesis testing: Null and alternative hypotheses; Confidence intervals and p-values; Errors: Type I and Type II; Parametric tests: t-tests, ANOVA, Chi-square; Non-parametric tests: Mann-Whitney, Wilcoxon, Kruskal-Wallis

**UNIT IV - Statistical Software and Scientific Writing:** Excel and SPSS: Data entry and analysis; GraphPad Prism for data visualization; Online tools for sample size calculation; Reference and citation management software; IMRaD structure: Introduction, Methods, Results, Discussion; Journal selection and manuscript submission; Peer-review process; Avoiding predatory journals; Plagiarism detection tools: Turnitin

**UNIT V - Application of Research in Health Programs:** Role of research in health policy and planning; Application of research findings in national programs (e.g., NHM, NTCP); Use of research evidence in public health decision-making; Case studies of successful policy translation from research

## Reference books

1. **Kothari, C.R., & Garg, G.** (2019). *Research Methodology: Methods and Techniques* (4th ed.). New Age International Publishers.
2. **Greenhalgh, T.** (2019). *How to Read a Paper: The Basics of Evidence-Based Medicine and Healthcare* (6th ed.). Wiley-Blackwell.
3. **Daniel, W.W., & Cross, C.L.** (2018). *Biostatistics: A Foundation for Analysis in the Health Sciences* (11th ed.). Wiley.
4. **Rosner, B.** (2015). *Fundamentals of Biostatistics* (8th ed.). Cengage Learning.
5. **Kirkwood, B.R., & Sterne, J.A.C.** (2003). *Essential Medical Statistics* (2nd ed.). Blackwell Science.
6. **Sullivan, L.M.** (2018). *Essentials of Biostatistics in Public Health* (3rd ed.). Jones & Bartlett Learning.
7. **Altman, D.G.** (1991). *Practical Statistics for Medical Research*. Chapman & Hall/CRC.
8. **Machin, D., & Campbell, M.J.** (2006). *Statistical Tables for the Design of Clinical Trials* (2nd ed.). Wiley-Blackwell.
9. **Fletcher, R.H., & Fletcher, S.W.** (2014). *Clinical Epidemiology: The Essentials* (5th ed.). Lippincott Williams & Wilkins.
10. **Indian Council of Medical Research (ICMR).** (2017). *National Ethical Guidelines for Biomedical and Health Research Involving Human Participants*. Retrieved from <https://ethics.ncdirindia.org/>