Title of the Course	**:**	Research Methodology for Pharmaceutical Sciences
Course Code	**:**	26CPHP01T
Course offered to	**:**	Pharmaceutical Sciences
Credits	**:**	2

Course Objectives:

1. To provide a comprehensive understanding of research design, methodology, and bio statistical principles applicable to pharmaceutical sciences.
2. To develop competence in ethical research practices, regulatory requirements, and good research conduct in pharmaceutical and health-related studies.
3. To equip scholars with skills for systematic data collection, management, analysis, and interpretation using appropriate research tools and techniques
4. To enhance scientific communication skills for effective dissemination of research findings through publications, presentations, patents, and reports.
5. To prepare scholars for conducting independent, innovative, and high-quality research that meets academic, industrial, and regulatory standards.

Course Outcomes:

1. Formulate research problems and hypotheses relevant to pharmaceutical sciences.
2. Design and execute research projects with appropriate methodology.
3. Apply statistical tools for data analysis and interpretation.
4 Prepare high-quality research reports, publications, and regulatory submissions.
5 Demonstrate ethical and professional conduct in research.

Unit 1 Fundamentals of Research 12

Meaning, objectives, and significance of research in pharmaceutical sciences, Types of research: Basic, applied, translational, clinical, regulatory, Research approaches: Qualitative vs. quantitative, Identification and formulation of research problems and Literature review and gap analysis

Unit 2 Research design and methods 12

Research design: Exploratory, descriptive, experimental, case study, Sampling techniques: Probability and non-probability sampling, Hypothesis formulation and testing, Variables: Independent, dependent, confounding, Ethical considerations in pharmaceutical research (ICMR, GCP, CPCSEA guidelines)

Unit 3 Data Collection and Tools 12

Primary and secondary data sources, Tools for data collection: Questionnaires, interviews, clinical trials, laboratory methods, Reliability and validity of tools, Use of modern analytical techniques in pharmaceutical sciences, Regulatory aspects in data collection (ICH, WHO, CDSCO guidelines)

Unit 4 Data Analysis and Interpretation 12

Statistical methods: Descriptive and inferential statistics, Parametric and non-parametric tests, Software tools: SPSS, Minitab, GraphPad Prism, Presentation of data: Tables, graphs, charts, Interpretation of results and drawing conclusions

Unit 5 Research Reporting and Dissemination 12

Structure of thesis, dissertation, and scientific papers, Referencing styles: Vancouver, APA, MLA, Plagiarism and research integrity, Publication ethics and predatory journals, Patents, intellectual property rights, and regulatory submissions

Prescribed Textbook:

1. Kothari CR, Garg G. Research Methodology: Methods and Techniques. 4th ed. New Delhi: New Age International Publishers; 2019.
2. Kumar R. Research Methodology: A Step-by-Step Guide for Beginners. 5th ed. London: SAGE Publications; 2022.

Reference Books:

1. Booth WC, Colomb GG, Williams JM, Bizup J, Fitzgerald W. The Craft of Research. 4th ed. Chicago: University of Chicago Press; 2016.
2. Indian Council of Medical Research. Ethical Guidelines for Biomedical Research on Human Participants. New Delhi: ICMR; 2017.
3. World Health Organization. Handbook for Good Clinical Research Practice (GCP): Guidance for Implementation. Geneva: WHO; 2002.
4. Cooper DR, Schindler PS. Business Research Methods. 12th ed. New York: McGraw-Hill Education; 2014.