ADVANCED RESEARCH METHODOLOGY AND COMPUTER APPLICATIONS

Paper Code: Ph.D.-CW-001	Advanced Research Methodology and Computer Applications	Credits:-4 (60 Hours)

Overview of the Course: Research is the foundation of development of the country and the society. The creation of knowledge for scientific development of any subject is based on research, creative thinking and creativity. Basic research methods, however, remains almost similar in all subjects but few are domain specific. Though, with the intervention of the technology drastic changes in the research methodology have been observed during the recent past and it is continuous process of evolution and invention of new techniques. Therefore, the main objectives of present course structure at doctoral research level are to provide the innovative/contemporary common methods and applications for doctoral research work of high quality and uniformity of the outcome of the thesis.

Course Objectives:-

1. To understand and introduce Research, types, process and Terminology.
2. To plan and develop the ability to formulate pertinent research questions and develop hypothesis, expected outcome & to identify appropriate research methods.
3. To implement the research in relation to social relevance with national and international significance and critically analyze published research literature, summarize them.
4. To learn about the computer and its role in research and understand online software to analyses research data.
5. To learn how to write synopsis, research report and thesis.

Course Outcomes: - On completion of the course scholars will be able to:

CO1: Demonstrate their analytical research aptitude which would be helpful to them to plan and completing good quality of research.
CO2: Identify, formulate and critically investigate research problems by applying research-oriented knowledge and analyze relevant data to reach certain conclusions in the form of alternative solutions to these problems.
CO3: To collect relevant literature from sources and to store and presentation of the information in scientific manner.
CO4: Acquire knowledge of concept of computer with application in Research and Apply acquired knowledge of computer for presentation skills.
CO5: The students will be able to write their synopsis, thesis and research report in a systematic way and learn how to represent their research data.

Methods of Teaching-Learning: - Doctoral research course is an advance category of course and most of the learners are mature and masters in their respective fields. The teaching methodology of the course will be a blended with students centric approach where direct contact

with supervisor/ concerned subject expert and self-leaning assignments will remain core while teaching learning process of the course. The classes will be held under hybrid mode with an opportunity to contact the supervisor/concerned subject expert/Director Research on any working day with mutual convenience. Practical classes will also be conducted.

Assessment: Assessment will be based on subjective/ Descriptive questions/ short questions/Objective MCQ and 100% external

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UNIT-I: - Introduction to Research
1. Introduction
2. Meaning, Scope, and Objectives of Research, Scientific/Literary Methods of Research
3. How to plan and do research (identification of research gaps, planning and strategies for doing high-quality research)
4. Types of Research
5. Different sources of Information/Scientific Literature/ Selection and storage of relevant references and data
6. Current trends in Research (Multidisciplinary, interdisciplinary and quasi-disciplinary and trans-disciplinary research)
7. Research Process

UNIT-II: - Research Planning Stage
1. Identification, Selection and formulation of Research Problem, brain storming, Necessity of Defining the Problem, technique Involved in Defining a Problem
2. Survey of available Literature and Bibliographical Research, Use of search engines, Formulation of keywords/variables/phrases for elementary literature review, significance and social relevance with national and international importance
3. Developing a Research Plan and Research Proposal: Research Design, Meaning of Research Design, Need for Research Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Design of experiment or inquiry
4. Hypothesis of a research problem: What is a Hypothesis? Basic Concepts Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Tests of Hypotheses: Testing of Hypotheses-I (Parametric or Standard Tests of Hypotheses), Variables: Definition, Types and Measurement of Variables
5. Sampling and Population: Identification of the 'Suitable Population' for the study and of 'Sampling' procedures, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample, Random Sample from an Infinite Universe, Complex Random Sampling Designs, Population

UNIT-III:-Research Implementation Stage
1. **Data Collection and Analysis**: Basic Tools and Methods of Data Collection, Types of Data Survey and Sampling (Collection of Primary Data Interview, Interview Method, and Interview Schedule, Questionnaire, validation of questionnaire, difference between

Questionnaires and Schedules confidentiality statement, Observations, Population size and sample size, e-interview/online interview and data collection tools, scientific storage of data for research Collection of Secondary Data),

2. **Data Presentation**: Tabulation and graphical Presentation: Tables, Charts and Graphs

UNIT-IV:-The Computer and Its Role in Research:

1. **The Computer and Computer Technology**: The Computer System, Important Characteristics, Computer Applications, Computers and Researcher, Use of Computer Database.
2. **Spreadsheet tool:** Introduction to spread-sheet applications, features & functions, using formulae & functions (data storing, features for statistical data analysis, generating charts/graphs & other features, pie diagrams, histograms, MS word/Excel, photography including GeoTag).
3. **Presentation tool:** Introduction to presentation tool, features & functions, creating presentations, Microsoft PowerPoint, Research presentation (PowerPoint presentation)
4. **MS WORD:** Text formatting, Type, MS Equation editor, INFLIBNET, e-journals, e-library, Scopus, Central blatt Math, Mathematical reviews.
5. **Web Search**: introduction to internet, Use of Internet Website, Webpage, E-mail, Search Engines, scientific search engines, using search engines using advanced search tools,. PDF and
   Latex files.
6. Data Communication and networks, LAN, WAN, GAN
7. Data and progress of use of online platforms in research: use of goggle meet, Zoom and other important online Platforms, meeting recording

UNIT-V: Synopsis/ Research proposal and Thesis Preparation:
1. **Synopsis preparation:** structure and Format of synopsis, Research Report and drafting Research Proposal: Types of research reports: Pre-Ph. D. Synopsis / Synopsis for Projects (beginning), Ph. D. Synopsis/ Synopsis for Projects
2. **Research Proposals:** Title of Research Project, Abstract / Summary, Introduction / Background, Origin of the Proposal, Hypothesis, Goals and/or Objectives of Research, Specific Aims, Significance and Impact, Methodology, Work plan and schedule, Budget, All other Operating Grants, Ethical Considerations, Outcomes / Results and Beneficiaries, Bibliography / References and Annexures, Referees, Co-applicants, Applicant's CV details, General Thoughts, Format of UGC Project Proposal, Format of the Proposal under Extramural Research (EMR, ICMR) etc.
1. Scheme of SERB, DST, ICMR, ICSSR (other government agencies) research proposal format, Indian Research Funding Agencies, General Foreign or International Funding Agencies, Opportunities for Research Scholars.
2. **Research Report :** The Preliminaries, Structural outlay of research report, Introduction, Chapters and sub-headings, Presentation of Data, Discussion, Conclusion and recommendations Graphical and Tabular Presentation of Results, Conclusion and Future Directions, Acknowledgement, References Styles and Citation Credits, Footnotes (or Endnotes), Bibliography/ Webliography/ Weblink /References, Conflict of Interests, Appendix, Index, Finalization of the Research Report, Structure of Thesis/Dissertation Preparation

Reference Books:-

1. Methodology and Techniques- By T.S. Bhandarkars & T.S. Milkinson
2. Kumar, Renjith (2009) Research Methodology: A Step by Step Guide for Research, Delhi,Pearson Education.
3. Kumar, Shekaran (2009) Research Methodology for Busines : A Skill Based Approach,
1. New York, John Wiley Publishers.
2. Methods in Social Research – By William J. Goode & Paul K. Hatt.
3. Development of Research Tools- By N.C. Gautam.
4. Designs of social Research- By D.K. Lal Das.
5. Doing quantitative Research in the Social Sciences-By Thomas R. Black.
6. Research Methods in behavioral sciences-By S.M. Mosil.
7. Legal Research Methodology-By Dr. H.N. Tiwari.
8. Legal Research – William P. Satisky.
9. Anderson J, Henry H Durston and Millicent Poole – Thesis and Assignment Writing. Wiley Eastern Ltd. New Delhi, 1977
10. Katre, S.M. - Introduction to Indian Textual Criticism, Poona, Deccan College, 1954

Note:-

The course may be completed through SWAYAM/MOOCs and the candidates may submit their valid credit score to the research section to be added in the course work Marks Sheet as per UGC guidelines