MAHATMA GANDHI UNIVERSITY

Ph.D. COURSE WORK SYLLABUS

Course (1)- Research Methodology

Syllabus Common to the stream : Science, Applied Science and Engineering

Unit 1 – Science and Research:

Definition – History – Evolution of Scientific Inquiry – Verification versus falsification – Objectivity : Facts, theory and concepts – Philosophy of Science and Technology, Epistemology of sciences – Construction of scientific facts.

Unit 2 - Introduction to Research Methodology

- Meaning and importance of Research – Types of Research – Selection and formulation of Research Problem
- Research Design – Need – Features – Inductive, Deductive and Development of models
- Developing a Research Plan – Exploration, Description, Diagnosis, Experimentation, Determining Experimental and Sample Designs.
- Analysis of Literature Review – Primary and Secondary Sources, Web sources –critical Literature Review
- Hypothesis – Different Types – Significance – Development of Working Hypothesis
- Research Methods: Scientific method vs Arbitrary Method, Logical Scientific Methods: Deductive, Inductive, Deductive-Inductive, pattern of Deductive – Inductive logical process – Different types of inductive logical methods.

Unit 3 - Data Collection and Analysis

- Sources of Data – Primary, Secondary and Teritary – Types of Data – Categorical, nominal & Ordinal.
- Methods of Collecting Data : Observation, field investigations, Direct studies – Reports, Records or Experimental observations.
- Sampling methods – Data Processing and Analysis strategies- Graphical representation – Descriptive Analysis – Inferential Analysis- Correlation analysis

– Least square method - Data Analysis using statistical package – Hypothesis – testing – Generalization and Interpretation – Modeling.

Unit 4 – Scientific Writing

- Structure and components of Scientific Reports – types of Report – Technical Reports and Thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports - Illustrations and tables – Bibliography, Referencing and foot notes – Oral presentation – Planning – Preparation and practice – Making presentation – Use of visual aids – Importance of Effective Communication.
- Conventions and strategies of Authentication – Citation Style - sheet
- Preparing Research papers for journals, Seminars and Conferences – Design of paper using TEMPLATE, Calculations of Impact factor of a journal, citation Index, ISBN & ISSN.
- Preparation of Project Proposal - Title, Abstract, Introduction – Rationale, Objectives, Methodology – Time frame and work plan – Budget and Justification - References

Unit 5 – Application of Results and Ethics

Environmental Impacts - Ethical Issues – Ethical Committees – Commercialization – copy right – royalty – Intellectual Property rights and patent law – Track Related aspects of intellectual property Rights – Reproduction of published material – Plagiarism – Citation and Acknowledgement – Reproducibility and accountability.

Unit 6 – Application of Computer in Research

- MS office and its application in Research – MS Word, MS Power point and MS Excel
- Basic principles of Statistical Computation using SPSS
- Use of Internet in Research – Websites, search Engines, E-journal and E-Library – INFLIBNET.

References: Science

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6. Hempel,C. Philosophy of Natural science Englewood Cliffs, N.J: Prentice Hall, 1966.

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