

GURU KASHI UNIVERSITY



Doctor of Philosophy

Session: 2025-26

Department of CA/CSE

Faculty of Computing

Faculty of Engineering & Technology

Program Structure										
Sr. No	Course Code	Course Title	Course Type	L	T	P	Credits	Internal	External	Total Marks
1	PPH101	Research Methodology	Core	4	0	0	4	30	70	100
2	PPH102	Research and Publication Ethics	Core	2	0	0	2	30	70	100
3	PPH117	Recent Advances in Computer Applications	Core	4	0	0	4	30	70	100
4	PPH104	Computer Applications in Research	Skill Based	0	0	4	2	30	70	100
Total							12	120	280	400

Course Title: Research Methodology

Course Code: PPH101

L	T	P	Credits
4	0	0	4

Total Hours:60

Learning Outcomes

On the completion of the course the students will be able to

1. Formulate research problems by conducting comprehensive literature reviews utilizing web sources
2. Apply appropriate research design choices based on research questions and objectives.
3. Explore the integration of qualitative and quantitative data and the concept of triangulation and complementarity of data sources.
4. Utilize statistical software packages commonly used in research for importing, managing, cleaning, and analyzing data.
5. Apply different statistical techniques to summarize and analyze data effectively.

Course Content

Unit-I

15 Hours

Introduction to Research

Meaning, Objectives, Characteristics, Significance and Types of Research.

Understanding a Research Problem, Literature Review, Methods and Reporting, Selecting the Research Problem, Steps in Formulation of a Research Problem

Unit-II

15 Hours

Research Process and Hypothesis

Constructing Hypotheses; Conceptualizing a Research Design-Meaning and Types of Research Design.

Parametric and Non-Parametric Test, Errors and Level of Significance.

Completely randomized design, Random block design, Latin square design, Statistical analysis.

Components of time series, Analysis of time series, Measurement of trend, Measurement of seasonal variations.

Unit-III

15 Hours

Sampling Design and Data Analysis

Sampling Techniques-Probability and Non-Probability, Qualities of a good Sample, Sample Size and its Determination.

Introduction to Qualitative, Quantitative and Mixed Methods, Quantitative Methods- Univariate, Bivariate and Multivariate, Qualitative Methods-Grounded Theory and Triangulations, Mixed Methods- Convergent Parallel, Explanatory Sequential, Exploratory Sequential and Transformative.

Implementation of statistical techniques using statistical packages viz. SPSS R including evaluation of statistical parameters and data interpretation, Regression Analysis, Covariance, analysis of variance.

Unit-IV

15 Hours

Report Writing

Types of Reports- technical and Popular Reports, Significance of Report Writing, Different Steps in Writing Report, Art of Writing Research Proposals, Research Papers, Projects Reports and Thesis; Basics of Citation and Bibliography/Reference Preparation Styles; Report Presentation: Oral and Poster Presentations of Research Reports.

Suggested Reading

1. Gupta, S. (2010). *Research Methodology and Statistical Techniques*. Deep & Deep Publications (P) Limited, New Delhi.

2. Kothari, C.R., Garg, G. (2019). *Research Methodology: Methods and Techniques*. 4th Edition, New Age International (p) Limited. New Delhi.
3. Sahay, Vinaya and Pradumna Singh(2009).*Encyclopedia of Research Methodology in Life Sciences*. Anmol Publications. New Delhi.
4. Kauda J. (2012). *Research Methodology: A Project Guide for University Students*. Sam funds literature Publications.
5. Dharmapalan B.(2012).*Scientific Research Methodology*. Narosa Publishing

Course Title: Research and Publication Ethics

Course Code: PPH102

L	T	P	Credits
2	0	0	2

Total Hours 30

Learning Outcomes

On the completion of the course the students will be able to

1. To have awareness about the publication ethics and publication misconducts.
2. To understand indexing and citation databases, open access publications, research metrics (citations, h-index, impact factor etc)
3. Develop hands-on skills to identify research misconduct and predatory publications.

Course Content

- **RPE 01: PHILOSOPHY AND ETHICS (3 Hrs.)**

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgements and reactions

- **RPE 02: SCIENTIFIC CONDUCT (5 Hrs.)**

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data

- **RPE 03: PUBLICATION ETHICS (7 Hrs.)**

1. Publication ethics: definition, introduction and importance
2. Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
5. Violation of publication ethics, authorship and contributorship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING (4 Hrs.)**

1. Open access publications and initiatives
 2. SHERPA/ROMEO online resource to check publisher copyright & self-archiving policies
 3. Software tool to identify predatory publications developed by SPPU
- Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

- RPE 05: PUBLICATION MISCONDUCT (4 Hrs.)
 - A. Group Discussions (2 hrs.)**
 1. Subject specific ethical issues, FFP, authorship
 2. Conflicts of interest
 3. Complaints and appeals: examples and fraud from India and abroad
 - B. Software tools (2 hrs.)**

Use of plagiarism software like Turnitin, Urkund and other open source software tools
- **RPE 06: DATABASES AND RESEARCH METRICS (7 Hrs.)**
 - A. Databases (4 hrs.)**
 1. Indexing databases
 2. Citation databases: Web of Science, Scopus etc.
 - B. Research Metrics (3 hrs.)**
 1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
 2. Metrics: h-index, g-index, i10 index, altmetrics

Suggested Readings

1. Bird, A. (2006). Philosophy of Science. Routledge.
 2. MacIntyre, A. (1967) A Short History of Ethics. London.
 3. P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978-9387480865
 4. National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition. National Academies Press.
 5. Rensik, D. B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10. Retrieved from <https://www.niehs.nih.gov/resources/bioethics/whatis/index.cfm>
- Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. <https://doi.org/10.1038/489179a>

Course Title: Recent Advances in Computer Applications**Course Code: PPH117**

L	T	P	Cr.
4	0	0	4

Learning outcomes:**Total Hours: 60****On the completion of the course the students will be able to**

1. Learn about the various real-world applications of Big Data across industries such as healthcare, finance, and social media.
2. Learners will be equipped to critically evaluate, analyze, and apply modern data analytic techniques, cloud solutions, IoT systems, and AI algorithms to solve real-world problems.
3. Students will learn to integrate concepts from machine learning, AI, and data analytics to innovate solutions across domains, enhancing their ability to work in interdisciplinary teams and contribute to cutting-edge technological developments.

Course Content**Unit I: Introduction to Big Data****15 Hours**

Big Data – Definition, Characteristic Features – Big Data Applications - Big Data vs Traditional Data - Risks of Big Data - Structure of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and Methods - Analysis vs Reporting - Modern Data Analytic Tools. Introduction to Hadoop.

Unit II: Image Processing Fundamentals**15 Hours**

Introduction – Elements of visual perception, Steps in Image Processing Systems – Digital Imaging System - Image Acquisition – Sampling and Quantization – Pixel Relationships – File Formats – Colour images and models - Image Operations – Arithmetic, logical, statistical and spatial operations.

Unit III: Cloud Computing**15 Hours**

Introduction to Cloud Computing- Evolution of Cloud Computing, Server Virtualization, Web Services Deliver from the Cloud- Communication-as-a-Service, Infrastructure- as-a-Service, Monitoring- as-a-Service, Platform- as-a-Service, Software- as-a-Service, Applications of cloud computing.

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology

Unit IV: Machine Learning, Deep Learning and AI**15 Hours**

Introduction to machine learning –Types of ML, Machine Learning algorithms (e.g., Linear Regression, Logistic Regression, Support Vector Machines (SVM)), Deep Learning algorithms (e.g., Convolutional neural network, Reinforcement Learning).

Artificial Intelligence in Research: Introduction, Definition of AI, Goals of AI, Turing Test, Applications of AI, AI Tools.

Suggested Readings

- Olivier Hersent, David Boswarthick, Omar Elloumi , –The Internet of Things – Key applications and Protocols, Wiley, 2012
- Richard Cotton, "Learning R – A Step-by-step Function Guide to Data Analysis, O'Reilly Media, 2013.
- Rafael C. Gonzalez and Richard E. Woods, –Digital Image Processing, Third Edition, Pearson Education, 2008, New Delhi
- Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", McGraw-Hill Osborne Media, 2009.
- Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015

Course Title: Computer Applications in Research

Course Code: PPH104

L	T	P	Credits
0	0	4	4

Total Hours: 30

Learning Outcomes

On the completion of the course the students will be able to

1. The students will become familiar with the usage of software for managing the reference.
2. To make literature reviews easily.
3. To make reference management by using open software.

Unit I

06 Hours

MS Word Essentials-Create a document with styled headings and subheadings, Add headers, footers, and page numbers, Adjust page layout settings (margins, orientation, page size).

Table Creation and Management-Insert, format, and style tables, Adjust cell size, merge/split cells, and sort/filter data.

Working with Graphics-Insert and format images, shapes, SmartArt, and text boxes, Apply text wrapping around objects.

Unit II

08 Hours

Basics of PowerPoint- Slide layouts, themes, and templates, Adding multimedia: Images, audio, and videos.

Advanced Techniques- Animations and transitions for visual effects, Slide master for consistent formatting, Interactive elements: Hyperlinks and action buttons.

Design Best Practices- Typography, color schemes, and visual hierarchy, Tips for engaging presentations.

Unit III

08 Hours

Introduction to Mendeley- Installing and setting up Mendeley Desktop and Web, Importing references from various sources.

Organizing References- Creating folders and tagging references, Annotating and highlighting PDFs.

Citations and Bibliography- Integrating Mendeley with MS Word, using citation

styles (APA, MLA, Chicago), Generating a bibliography automatically.

Unit IV

08 Hours

AI Tools for Productivity- Text-Based AI Tools (e.g., ChatGPT) Writing assistance, summarization, and brainstorming, Grammar and style checking, Image and Design Tools, Speech and Audio Tools

Suggested Readings

- 1) Office 2007 in Simple Steps, Kogent Solutions, (Wiley Publishers).
- 2) MS-Office 2007 Training Guide, S. Jain (BPB Publications).
- 3) Computer Fundamentals by P.K. Sinha (BPB Publications).
- 4) <https://www.mendeley.com/reference-management/reference-manager>
- 5) <https://chat.openai.com>
- 6) <https://edu.google.com/workspace-for-education/classroom/>