

Branch Name:	Bachelor of Computer Application (BCA)
Program Code:	CS101
Course Title:	Research Methodology–II
Course Code:	17-CAM402-4C
Pre-requisite Course:	Basic knowledge of statistics, computer applications, and academic writing skills.

Course Objective (CO):

This course is intended to make the students:

- To introduce fundamentals of research methodology in computing domain.
- To understand research problem identification and formulation.
- To develop knowledge of research design and data collection methods.
- To understand statistical techniques used in research.
- To develop skills in research proposal writing and technical documentation.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	2	4	50	25	-	25	100

Course Contents:

Sr. No	Topics	Total Hours	Weightage (%)
1.	Advanced Research Design: Qualitative vs Quantitative Research; Mixed Method Research; Experimental Design; Case Study Method; Action Research; Research Validity & Reliability; Internal and External Validity; Pilot Study Design; Research Gap Identification; Conceptual Framework Development	09	20
2.	Advanced Statistical Analysis: ANOVA (Conceptual); Regression Analysis; Non-parametric Tests; Multivariate Analysis (Basics); Interpretation of Statistical Results; Hypothesis Testing using p-values; Confidence Intervals; Error Analysis (Type I & II); Factor Analysis (Introduction); Model Goodness-of-Fit Testing	09	20
3.	Research Tools & Software: Use of Statistical Software (SPSS/R/Excel); Data Visualization Techniques; Data Cleaning & Validation; Interpretation of Software Output; Handling Missing Data; Research Data Management Systems; Python Libraries for Research (Conceptual); Reference Management Tools; Survey Tools; Automation in Data Collection	09	20
4.	Research Publication & Ethics: Research Paper Writing for Journals; Structure of Thesis/Dissertation; Impact Factor & Indexing; Citation Metrics; Peer Review Process; Avoiding Plagiarism; Research Misconduct; Copyright & IPR in Research; Predatory Journals; Data Privacy & Confidentiality	09	20
5.	Project Planning & Proposal Development: Project Identification; Feasibility Study; Cost-Benefit Analysis; Gantt Chart & Project Scheduling; Funding Proposal Writing; Presentation Skills; Risk Assessment & Mitigation; Budget Preparation; Monitoring & Evaluation; Technology Transfer & Commercialization	09	20

Course Learning Outcomes (CLO):

At the end of this course, the student would be able

- **CLO1:** Apply advanced research design techniques.
- **CLO2:** Analyze complex research data using statistical tools.
- **CLO3:** Use modern research software and data management systems.
- **CLO4:** Prepare research publications following ethical standards.
- **CLO5:** Develop research proposals and manage projects effectively.

List of Text Book:

- John W. Creswell – *Research Design: Qualitative, Quantitative and Mixed Methods*
- Montgomery – *Design and Analysis of Experiments*
- Andy Field – *Discovering Statistics Using SPSS*

List of Reference Book:

- C.R. Kothari – *Research Methodology: Methods and Techniques*
- Trochim – *Research Methods Knowledge Base*

E-Resource / Web Links:

- <https://nptel.ac.in>
- <https://scholar.google.com>
- <https://ieeexplore.ieee.org>
- <https://www.scopus.com>
- <https://www.researchgate.net>

Practical List

- Data Analysis using Excel
- Performing ANOVA/Regression (Basic Implementation)
- Case Study Research Design Preparation
- Data Visualization and Interpretation
- Research Paper Drafting (IEEE/APA Format)
- Plagiarism Checking & Similarity Report Interpretation
- Preparation of Dissertation/Project Proposal
- Research Presentation (Seminar)

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CLO1	M	H	H	H	H		M	M				M	H	H	
CLO2	H	H	M	H	H								M	H	
CLO3	H	M	H	H	H		M	M				M	H	H	
CLO4		M		M	M	H	H		H	M	H		M	H	H
CLO5	M	H	H	H	H	M	H	H	H	M	H	H	H	H	H

H: High, M: Medium, L: Low