# RIMT UNIVERSITY
# MANDI GOBINDGARH, PUNJAB



## Study Scheme & Syllabus

For

**Ph.D. (2021-22)**

## Department of Computer Applications

**RIMT UNIVERSITY**

**MANDI GOBINDGARH, PUNJAB**

## VISION

To become one of the most preferred learning places and a centre of excellence to promote and nurture future leaders who would facilitate the desired change in the society.

## MISSION

- To impart teaching and learning through cutting-edge technologies supported by the world class infrastructure
- To empower and transform young minds into capable leaders and responsible citizens of India instilled with high ethical and moral values.
- To develop human potential to its fullest extent and make them emerge as world class leaders in their professions and enthuse them towards their social responsibilities.

# SCHOOL OF COMPUTER APPLICATIONS

## VISION

- Strives to groom students with diverse backgrounds into competitive software professionals with moral values and committed to build a vibrant nation.

# MISSION

- To provide a strong theoretical and practical background across the computer science discipline with an emphasis on software development.
- To provide technical solutions in the field of Information technology to the local society.

- To provide need-based quality training in the field of Information Technology.
- To provide students with the tools to become productive, participating global citizens and life-long learners.

**ABOUT THE PROGRAM**

The program will develop the candidate's independent and reflective knowledge and skills for his/her own research and others as well as the role of research in a broader context. A candidate will achieve the following course outcomes in terms of knowledge, skills, and general competencies, after completing the Ph.D. program.

## SCHOOL OF COMPUTER APPLICATIONS

## PROGRAM EDUCATION OBJECTIVES

| PEO1 | To acquaint students with the concept of research and educational research. To develop an understanding of the nature and scope of educational research. |
|------|--------|
| PEO2 | Students will be equipped with skills to undertake research work |
| PEO3 | To develop an understanding of the basic framework of the research process and publications |
| PE04 | To develop the capacity to serve the various higher academic institutions like Colleges, Universities, and National Research Institutes in various fields of apex academic research |

# Program Outcomes for Ph.D. in Computer Applications

| PO 1 | Understanding different research methods, Equipping scholars with relevant tools and techniques, Data collection and analysis by using statistical measures, use of conceptual understanding in practical research work, and writing a research report. |
|------|--------|
| PO 2 | To identify and critically evaluate research and publication of ethical issues within the area of teacher education |
| PO 3 | Enhance the analytical and interpretation skills of data, Scholars are well trained in using statistical measures, and software- SPSS; MS EXCEL, etc. |
| PO 4 | Use ICT in research perspective, design and develop ICT integrated learning resources, analysis, and interpretation of the research data with the help of ICT. |
| PO 5 | Apply critical, analytical, and communication skills in developing professional presentations and writing. |

| PO 6 | To access and extract the desired information from the different scientific databases and resources |
|------|----------------------------------------------------------------------------------------------------|
| PO 7 | Develop the analytical and reflective skills for resolving the critical educational issues |
| PO 8 | Students will be acquainted with the statistical techniques in research |

## PROGRAM SPECIFIC OUTCOME

| PSO 1 | To plan and conduct original research that addresses questions of significance in a particular subject area in Computer Science. |
|-------|--------------------------------------------------------------------------------------------------------------------------------|
| PSO 2 | To demonstrate in-depth knowledge of a particular subject area within Computer Science. |
| PSO 3 | To master broad knowledge of Computer Science across algorithms, software, systems, theory of computation, and in one of the areas of artificial intelligence, computer graphics, cryptography & security, and data science. |

# Programme Name: Ph.D. (Doctor of Philosophy) Computer Applications

## Programme Code: CSA-501

**MAPPING OF PROGRAM SPECIFIC OUTCOMES (PSOs) WITH PROGRAM OUTCOMES (POs)**

A broad relation between the program-specific outcomes and the program outcomes is given in the following table:

| PROGRAM SPECIFIC OUTCOMES (PSOs) | PROGRAM OUTCOMES | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| PSO 1 | - | 2 | 2 | 2 | 1 | 1 | 2 | 2 |
| PSO 2 | 3 | 1 | - | - | 1 | 1 | - | 1 |
| PSO 3 | - | 1 | 2 | 3 | - | 2 | 1 | 3 |

## Contribution:

"1"          Slight (Low) Correlation

"2"          Moderate (Medium) Correlation

"3"          Substantial (High) Correlation

"-"           Indicates there is no Correlation.

# Program: Ph.D. Course Work 2021-22

# Subject: Computer Applications

# Program Code: CSA-501

| Course | | Contact Hours/Week | | | Credit | Contact Hrs. | Evaluation Scheme (% of Total Marks) | | | Exam Duration (Hours) |
|---|---|---|---|---|---|---|---|---|---|---|
| Course Code | Course Title | L | T | P | | | Internal | External | Total | |
| RMS 5 01 | Research Methodology & Statistical Techniques | 5 | 0 | 0 | 5 | | 60 | 40 | 100 | 3 Hrs |
| CAR 502M | Computer Applications in Research | 3 | 0 | 0 | 3 | | 60 | 40 | 100 | 3 Hrs |
| CSA 5031 | Advance Course in Computer Applications (Core Subject) | | | | | | 60 | 40 | 100 | 3 Hrs |
| CSA 5031 | Advanced Course in Multimedia (Core Subject) | 5 | 0 | 0 | 5 | | | | | |
| MRP 504M | Mini research Project | 2 | 0 | 0 | 2 | | 60 | 40 | 100 | 3 Hrs |
| RPE-503 M | Research &Publication Ethics | 2 | 0 | 0 | 2 | | 60 | **40** | | |
| **Total** | | 17 | 0 | 0 | 17 | | 300 | 200 | **500** | |

# RIMT UNIVERSITY

## Course Objectives

a) To familiarize participants with the basics of research and the research process.
b) To enable the participants in conducting research work and formulating a research synopsis and report.
c) To impart knowledge for enabling students to develop data analytics skills and meaningful interpretation of the data sets to solve the business/Research problem.

## Course Outcome

The aim of the course is to provide participants with an introduction to research methods and report writing. Upon successful completion of the course, the students will be able to:
RMS 501.CO1 Able to Develop an understanding about various kinds of research, objectives of doing research, research process, research design, and sampling.
CAR 502M.CO2 Able to gain a basic knowledge of qualitative research techniques.
CSA 5031/5032.CO3 Able to achieve a detailed conceptual knowledge of domain areas in the field computer sciences.
MRP 504M/RPE 503.CO4 Able to get a basic awareness about various literature
surveys & review techniques

### Unit-I

**Introduction to Research Methodology:** Meaning, nature, and scope; types of research, and research process. *Problem Definition:* Research problem; the necessity of defining the problem; techniques involved in defining a problem; review of literature and identification of research gaps.

**Research Design:** Meaning of research design; need for research design; features of a good design; important concepts relating to research design; and different research designs.

**Sampling Design:** Census and sample survey; steps in sampling design; criteria of selecting a sampling; characteristics of a good sample design; different types of sample designs; and random sampling design.

### Unit-II

**Measurement and Scaling Techniques:** Sources of error in measurement; tests of sound measurement; and important scaling techniques.

**Data Collection:** Collection of primary data; observation method; interview method; a collection of data through questionnaires; collection of data through schedules; latest advances in methods of data collection; collection of secondary data; the case study method.

**Data Analysis-I:** *Descriptive Statistics Analysis* covering measures of central tendency, dispersion and asymmetry; measures of relationship using regression, correlation, and association (in case of attributes). *Inference Statistics Analysis covering* sampling theory, concept of standard error, and the problem of estimation of a sample size.

## Unit-III

**Data Analysis-II:** Testing of hypotheses covering basic concepts, procedure for hypothesis testing, tests of hypotheses, tests of significance for large samples and small samples, students t-distribution, properties, and t-distributions and the t-levels applications of the t-distribution, chi-square test and goodness of fit, F-test and Z test, analysis of variance, non-parametric test, The Mann – Whitney test, Krushal-Wallias test. *Multivariate Regression Analysis:* econometric model formulation, estimation, testing and interpretation.

## Unit-IV

**Research Tools:** *MS-Excel,* covering broad structure, features, data /file handling, formulae /functions and brief review of utilities of the package. *Statistical/Econometric Package* covering structure of package, data and file handling utilities and analysis utilities of the package.

**Interpretation and Report Writing:** Technique of Interpretation: Different Steps in Writing Report.

**Recommended books:**

1. Kothari, C.R., *Research Methodology: Methods and Techniques*, New Age International Publishers, New Delhi, 2010.
2. Garrett Henery E., *Statistics in Psychology and Education*, Longmans, Green, And Co., 1958.
3. Fisher, R.A., *Statistical Methods for Research Workers*, Springer-Verlag New York, Inc. 1992.
4. Gupta, S.P, *Statistical Methods*, Sultan Chand &Sons, New Delhi, 2019.

5. Allen, R.G.D., *Statistics for Economists*. London (Hutchinson), 1949.
6. Blair, Morris M. *Elementary Statistics*, Henry Holt and Co., 1944
7. Smith and Smith, *Business and Economic Statistics*, South Western publishing co., 1996.

**CO-PO Mapping**

| Course Outcome (CO) | Program Outcome (PO) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| CO3 | 3 | 1 | 3 | 2 | 2 | 3 | 2 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |

# Ph.D. Course Work
## Course Name: Computer Applications in Research

## Course Code: CAR 502 M

**Course Outcomes:** After the completion of course-work, the candidates will able to:

| | |
|---|---|
| CAR502M.CO1 | Present the graphical representations of data |
| CAR502M.CO2 | Make use of applications of MS Office |
| CAR502M.CO3 | Learn the functional units and classify types of computers, how they process information and how individual computers interact with other computing systems and devices |
| CAR502M.CO4 | Understand the role of latest trends and techniques in computer applications |
| CAR502M.CO5 | Computing and presentating the data analysis using tools like MSExcel and MS Powerpoint. |

**Syllabus Content:**

| Sr. No | Contents |
|---|---|
| Unit I | **Computer Fundamentals:** Data and Information, Characteristics of Computers, Various fields of application of Computers, Input-output Devices (Hardware, Software, Human ware and Firmware), Advantages and Limitations of Computer, Block Diagram of Computer, Function of Different Units of Computer, Classification of Computers. Types of Software, Application software and system software. Introduction to Operating System. |
| Unit II | **Word Processor:** Various aids useful for thesis writing, adding references to documents, citing a citation in text, macros, hyperlinks, mail-merge etc. **Power Point Presentations:** PowerPoint, Features of MS PowerPoint Clipping, Design layouts, hyperlinks, tables, insertion of multi-media files, Slide Animation, Slide Shows, Formatting etc. Case study. **MS-Excel:** Introduction to Electronic Spreadsheets, Feature of MS-Excel, Entering Data, Entering Series, Editing Data, Cell Referencing, ranges, Formulae, Functions, Auto Sum, Copying Formula, Formatting Data, Creating Charts, Statistical functions, Sorting Data, Filtering etc. |

| Unit III | **Internet and applications of IT:** Program Vs Software, Software Engineering, SDLC, DBMS, Data Models, DFD, Specification Tool: SMARTDRAW. Case Study on DFD. |
|---|---|
| Unit IV | **Latest trends in Computing:** Cloud computing, Data mining, Data Warehousing, Object Oriented Relational Database Management, Object Oriented Relational Database Management System, Distributed databases Concept, Three tier Client/ Server Architecture, Digital Image Processing, etc. |

**Recommended books:**

1. Pardeep K. Sinha, Priti Sinha, Computer Fundamentals, BPB Publications.
2. Rajaraman, V., Fundamental of Computers. Prentice Hall India, New Delhi.
3. R. S. Salaria, Fundamentals of Computers, Salaria Publishing House

**CO-PO Mapping**

| Course Outcome (CO) | Program Outcome (PO) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| CO3 | 3 | 1 | 3 | 2 | 2 | 3 | 2 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |
| CO5 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 |

# Ph.D. Course Work (Core Subject)
## Course Name: Advance Course in Computer Applications

## Course Code: CSA 503 1

**Objectives:** On completion of the course, the Research Scholars will be able to:

- Understand the core concepts of Software engineering, data mining, data warehousing, soft computing.

**Course Outcomes:** After the completion of course-work, the candidates will able to:

| CSA 503 1. CO1 | Identify the key activities in managing a software project. |
|---|---|
| CSA 503 1. CO2 | Understand and explore the basics of Computer Networks and Various Protocols. |
| CSA 503 1. CO3 | Administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile, and ad hoc networks. |
| CSA 503 1. CO4 | Illustrate the knowledge of Soft Computing as Networks, Fuzzy Logic and Genetic Algorithms and its Hybrid Applications. |

**Syllabus Content:**

## SECTION-I

Software testing fundamentals: black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing. User Interface Design: Interface analysis, Interface Design. COCOMO. Exploring the Max Interface, Controlling & Configuring the Viewports, Customizing the Max Interface & Setting Preferences, Working with Files, Importing & Exporting, Selecting Objects & Setting Object Properties, Duplicating Objects, Creating & Editing Standard Primitive & extended Primitives objects, Transforming objects, Pivoting, aligning etc.

## SECTION-II

**DATA COMMUNICATION**: Reference Models: OSI Reference Model, TCP/IP reference Model. Routing Algorithms: Optimality principle, Shortest path routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast and Multi Cast Routing, Routing for Mobile hosts, Routing in Adhoc Networks. Introduction to Network security. Wireless LAN protocols, IEEE 802.3, 802.4, 802.5 standards and their comparison. **CLOUD COMPUTING:** Concept, Cloud Summary, Cloud Architecture, Cloud Computing characteristics, Cloud service models: Saas, Paas and Iaas. Advantages and Disadvantages of Cloud Computing. **Big Data**: Definition, Characteristics and Architecture.

## SECTION-III

**NEURAL NETWORKS:** Concept, Application Scope of Neural Network, Fuzzy Logic, Genetic Algorithm, Hybrid Systems, Soft Computing. **Artificial Neural Network:** Fundamental Concept, Evolution of Neural Networks, Basic Models of Artificial Neural Network, Important Terminologies of ANNs, McCulloch-Pitts Neuron, Linear Separability, Hebb Network. **Supervised Learning Network:** Introduction, Perception Networks, Back-Propagation Network, Radial Basis Function Network, Time Delay Neural Network. **Associative Memory Networks:** Introduction, Training Algorithm of Pattern Association, Types, Bidirectional Associative Memory, Hopfield Networks (Discrete Only). **Unsupervised Learning Networks:** Introduction, Fixed Weight Competitive Nets, Kohonen Self-Organizing Motor Maps, Adaptive Resonance Theory Network.

**DATA MINING**: Introduction–Data–Types of Data–Data Mining Functionalities–Interestingness of Patterns–Classification of Data Mining Systems–Data Mining Task Primitives–Integration of a Data Mining System with a Data Warehouse–Issues–Data Preprocessing. Association Rule Mining and Classification: Mining Frequent Patterns, Associations and Correlations – Mining Methods–Mining Various Kinds of Association Rules– Correlation Analysis–Constraint Based Association Mining–Classification and Prediction-Basic Concepts-Decision Tree Induction-Bayesian Classification–Rule Based Classification– Classification by Backpropagation–Support Vector Machines.

### TEXT/REFERENCE BOOKS
1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2019.
2. Roger S. Pressman, "Software Engineering – A Practitioners Approach", Seventh Edition, McGraw-Hill International Edition, 2019.
3. Computer Networks - Andrew S Tanenbaum, 6th Edition, Pearson Education.

4. S.N. Sivanandam and S.N. Deepa, "Principles of Soft Computing", Wiley India (P) Ltd.

**CO-PO Mapping**

| Course Outcome (CO) | Program Outcome (PO) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| CO3 | 3 | 1 | 3 | 2 | 2 | 3 | 2 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |

## Ph.D. Course Work (Core Subject)
### Course Name: Advance Course in Multimedia

### Course Code: CSA 503 2

**Syllabus Content:**

### SECTION-I
**3DModelling:** Modeling with Polygons, using the graphite, working with XRefs, Building simple scenes, Building complex scenes with XRefs, using assets tracking, deforming surfaces & using the mesh modifiers, modeling with patches & NURBS. **Keyframe Animation:** Creating Keyframes, Auto Keyframes, Move & Scale Keyframe on the timeline, Animating with constraints & simple controllers, animation Modifiers & complex controllers, function curves in the track view, motion mixer etc

### SECTION-II
**Simulation & Effects:** Bind to Space Warp object, Gravity, wind, displace force object, deflectors, FFD space warp, wave, ripple, bomb, Creating particle system through parray, understanding particle flow user interface, how to particle flow works, hair & fur modifier, cloth & garment maker modifiers etc. **Lighting & Camera:** Configuring & Aiming Cameras, camera motion blur, camera depth of field, camera tracking, using basic lights & lighting Techniques, working with advanced lighting, Light Tracing, Radiosity, video post, mental ray lighting etc.

**Texturing with Max:** Using the material editor & the material explorer, creating & applying standard materials, adding material details with maps, creating compound materials & material modifiers, unwrapping UVs & mapping texture, using atmospheric & render effects etc **Rendering with V-Ray:** V-ray light setup, V-ray rendering settings, HDRI Illumination, Fine-tuning shadows, Final render setting etc

**Course Outcomes:** After the completion of course-work, the candidates will able to:

| CSA 503 2. CO1 | Identify the key activities in managing a multimedia based project. |
|---|---|
| CSA 503 2. CO2 | Understand and explore the basics of Animation and multimedia. |
| CSA 503 2. CO3 | Administrate a network and flow of information further he/she can understand easily the concepts of 2d and 3d animation. |

**CO-PO Mapping**

| Course Outcome (CO) | Program Outcome (PO) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| CO3 | 3 | 1 | 3 | 2 | 2 | 3 | 2 | 2 |

**Ph.D. Course Work**
**Course Name: Mini research Project/Literature Review**
**Course Code: MRP 504 M**

Each student enrolled for Ph.D. will have to undertake atleast two credit of literature review. The topic of the review will be given by the committee of faculty of the department with the approval of Head of the department. Student will make presentation on the assigned topic in front of all the faculty members and following criteria will be used to assess the performance of the students:

**Course Outcomes:** After the completion of course-work, the candidates will able to:

| | |
|---|---|
| **MRP 504 M. CO1** | Identify the procedure of writing a literature review. |
| **MRP 504 M. CO2** | Understand the structure of a research paper. |
| **MRP 504 M. CO3** | Write a research paper as per the templates like IEEE. |

**CO-PO Mapping**

| Course Outcome (CO) | Program Outcome (PO) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** |
| **CO1** | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| **CO2** | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 |
| **CO3** | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 |

## Criteria for assessment:

The faculty members of the department will evaluate the presentation of the students using the following criteria:

| | Definition and Methodology | Literature review/ Conceptual Framework | Findings and Conclusion | Presentation and Communication of Ideas | Questions-answers | Report File |
|---|---|---|---|---|---|---|
| Marks | 15 | 15 | 15 | 15 | 15 | 25 |

Averages of all the marks awarded by the faculty members will be utilized to final assess the performance of students.

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**Ph.D. Course Work**
**Course Name: Research Publications & Ethics**

**Course Code: RPE 503M**

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**Course Outcomes:** After completion of the course, the scholars will be able to:

- To understand the philosophy of science and ethics, research integrity and publication ethics
- To identify research misconduct and predatory publications.
- To understand indexing and citation databases, open access publications, research metrics (citations, h-index, impact Factor, etc.)
- To understand the usage of plagiarism tools.

**THEORY:**
- **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 judgments 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
  4. 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: DATA BASES 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, C ite Score
     2. Metrics: h-index, g-index, i10index, altmetrics

**SUGGESTED READINGS:**

- The Ethics of Teaching and Scientific Research By Miro Todorovich; Paul Kurtz; Sidney Hook.
- Research Ethics: A Psychological Approach By Barbara H. Stanley; Joan E. Sieber; Gary B. Melton
- Research Methods in Applied Settings: An Integrated Approach to Design and Analysis By Jeffrey A. Gliner; George A. Morgan Lawrence Erlbaum Associates, 2000

- Ethics and Values in Industrial-Organizational Psychology By Joel Lefkowitz Lawrence Erlbaum Associates, 2003.
- Robin Levin Penslar, Research Ethics: Cases and Materials, Indiana University Press
- Chowdhary, N., & Hussain, S. (2021). Handbook of Research and Publication Ethics. Bharti Publications: New Delhi

**CO-PO Mapping**

| Course Outcome (CO) | Program Outcome (PO) | | | | | | | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 2 | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| CO3 | 3 | 1 | 3 | 2 | 2 | 3 | 2 | 2 |
| CO4 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 |