



**Dr. BABASAHEB AMBEDKAR MARATHWADA
UNIVERSITY,**

CHHATRAPATI SAMBHAJINAGAR

PRE-Ph.D. COURSE WORK SYLLABUS

FACULTY: INTERDISCIPLINARY STUDIES

SUBJECT: PHYSICAL EDUCATION

31-08-2026

PRE-Ph.D. COURSE WORK**COURSE-1 (C-1): RESEARCH METHODOLOGY**

Particular	Details
Course No.	C-1
Course Name	Research Methodology
Programme	Pre-Ph.D./Ph.D. Coursework
Credits	4 Credits
Maximum Marks	100 Marks
Number of Units	4 Units
Marks per Unit	25 Marks
Nature of Course	Core/Compulsory Research Course
Discipline	Physical Education and Sports Sciences
Suggested Contact Hours	60 Hours

1. COURSE DESCRIPTION

Research Methodology is a core doctoral-level course designed to develop advanced competencies required for the **conceptualization, planning, design, execution, analysis, interpretation and scholarly dissemination of research** in Physical Education and Sports Sciences.

The course provides systematic understanding of the philosophy and nature of scientific inquiry; identification and formulation of research problems; critical review and synthesis of literature; formulation of research questions, objectives and hypotheses; selection of appropriate research designs; sampling; measurement; development and validation of research instruments; quantitative, qualitative and mixed-method approaches; statistical analysis; computer-assisted research; interpretation of findings; research ethics; academic integrity; and preparation of research proposals, theses, dissertations and research publications.

The course shall emphasize **doctoral-level critical thinking, methodological rigor, reproducibility, evidence-based decision-making and independent research competence.**

The course is particularly applicable to research in:

- Physical Education
- Exercise Science
- Sports Science
- Sports Training
- Exercise Physiology
- Kinesiology
- Biomechanics
- Sports Psychology
- Sports Medicine
- Test, Measurement and Evaluation

- Yoga and Wellness
- Adapted Physical Education
- Sports Management
- Sports Technology
- Physical Literacy
- Inclusive Physical Education
- Interdisciplinary and multidisciplinary research

2. COURSE OBJECTIVES

After completing the course, the research scholar shall be able to:

1. Explain the philosophy, nature, scope and characteristics of scientific research.
2. Critically examine different approaches and paradigms of research.
3. Identify, formulate, justify and delimit a significant research problem.
4. Conduct a systematic and critical review of scholarly literature.
5. Identify research gaps and establish the originality and significance of a proposed study.
6. Formulate appropriate research questions, objectives and hypotheses.
7. Select and justify appropriate research designs and methodologies.
8. Determine appropriate population, sample and sampling procedures.
9. Select, develop and validate research instruments.
10. Understand principles of reliability, validity, objectivity and measurement error.
11. Apply appropriate quantitative, qualitative and mixed-method research approaches.
12. Select appropriate statistical techniques according to research questions and data characteristics.
13. Use statistical and research software for data management and analysis.
14. Interpret statistical findings with reference to statistical and practical significance.
15. Demonstrate competence in qualitative data coding, categorization and thematic analysis.
16. Apply ethical principles in research involving human participants.
17. Understand plagiarism, fabrication, falsification, authorship and other forms of research misconduct.
18. Prepare a scientifically sound research proposal.
19. Prepare a doctoral thesis/research article according to accepted scholarly standards.
20. Critically evaluate published research and communicate research findings effectively.

3. COURSE LEARNING OUTCOMES

On successful completion of C-1, the scholar shall be able to:

CLO	Course Learning Outcome
CLO1	Critically explain the philosophical foundations, nature and characteristics of scientific research.
CLO2	Identify and formulate significant, feasible and researchable problems in Physical Education and Sports Sciences.
CLO3	Conduct and critically synthesize scholarly literature and identify research gaps.
CLO4	Formulate appropriate research questions, objectives, hypotheses and conceptual

	frameworks.
CLO5	Select and justify appropriate quantitative, qualitative or mixed-method research designs.
CLO6	Apply appropriate sampling, measurement and data-collection procedures.
CLO7	Evaluate the validity, reliability and objectivity of research instruments.
CLO8	Apply appropriate statistical and qualitative analytical techniques using research software.
CLO9	Interpret, evaluate and communicate research findings scientifically and critically.
CLO10	Demonstrate ethical, transparent, reproducible and responsible conduct of research.

4. DETAILED COURSE CONTENT

UNIT-I

FOUNDATIONS OF SCIENTIFIC RESEARCH, RESEARCH PROBLEM AND LITERATURE REVIEW

25 Marks

A. Foundations and Philosophy of Research

1. Meaning, definitions and concept of research.
2. Nature and characteristics of scientific research.
3. Objectives and purposes of research.
4. Scope and significance of research.
5. Scientific method and scientific inquiry.
6. Research as a systematic and logical process.
7. Evidence-based research and evidence-based practice.
8. Basic, applied and action research.
9. Exploratory, descriptive, explanatory and evaluative research.
10. Experimental and non-experimental research.
11. Interdisciplinary, multidisciplinary and transdisciplinary research.
12. Research paradigms:
 - Positivism
 - Post-positivism
 - Interpretivism/Constructivism
 - Pragmatism
13. Deductive and inductive reasoning.
14. Theory-driven and empirical research.
15. Replication, reproducibility and transparency in research.

B. Identification and Formulation of Research Problem

1. Meaning and characteristics of a research problem.
2. Sources of research problems.
3. Identification of researchable problems.

4. Research gap, knowledge gap and methodological gap.
5. Criteria for selecting a research problem:
 - o Significance
 - o Originality
 - o Feasibility
 - o Relevance
 - o Scientific value
 - o Social/practical utility
6. Novelty and originality.
7. Scope and delimitations.
8. Limitations and assumptions.
9. Operational definitions.
10. Development of a research problem statement.
11. Formulation of title of the study.
12. Identification of variables and constructs.

C. Research Questions, Objectives and Hypotheses

1. Research aim.
2. General and specific objectives.
3. Research questions.
4. Relationship among:
 - o Research problem
 - o Research questions
 - o Objectives
 - o Hypotheses
5. Conceptual framework.
6. Theoretical framework.
7. Operationalization of constructs.

D. Literature Review

1. Meaning, purpose and importance of literature review.
2. Primary and secondary sources.
3. Scholarly journals, books, theses and dissertations.
4. Government and institutional reports.
5. Electronic databases.
6. Search terminology and keywords.
7. Boolean operators.
8. Citation tracking.
9. Forward and backward searching.
10. Critical reading of research papers.
11. Critical appraisal of methodology.
12. Synthesis versus simple description.
13. Identification of research gaps.
14. Development of literature-review matrix.
15. Systematic and scoping literature searches.
16. Citation and referencing.
17. APA referencing.
18. Reference-management systems.

E. Doctoral Research Application

The scholar shall critically examine published studies in Physical Education and Sports Sciences and identify:

- research problem;
- research gap;
- objectives;
- variables;
- methodology;
- limitations; and
- potential directions for future research.

UNIT-II

RESEARCH DESIGN, SAMPLING, VARIABLES AND MEASUREMENT

25 Marks

A. Research Design

1. Meaning and importance of research design.
2. Principles of research design.
3. Selection of design according to research objectives.
4. Internal and external validity.
5. Experimental research designs:
 - o Pre-experimental
 - o True experimental
 - o Randomized controlled trial
 - o Factorial design
 - o Repeated-measures design
 - o Crossover design
6. Quasi-experimental designs.
7. Non-experimental designs:
 - o Descriptive
 - o Survey
 - o Correlational
 - o Comparative
 - o Ex-post facto
 - o Longitudinal
 - o Cross-sectional
8. Single-subject research designs.
9. Qualitative research designs:
 - o Case study
 - o Phenomenology
 - o Ethnography
 - o Grounded theory
 - o Narrative research
10. Mixed-method research designs:

- Convergent
- Explanatory sequential
- Exploratory sequential
- Embedded designs

11. Selection and justification of research design.

B. Population and Sampling

1. Population and target population.
2. Accessible population.
3. Sampling frame.
4. Sample and census.
5. Sampling error.
6. Probability sampling:
 - o Simple random
 - o Systematic
 - o Stratified
 - o Cluster
 - o Multistage
7. Non-probability sampling:
 - o Convenience
 - o Purposive
 - o Quota
 - o Snowball
8. Sampling in qualitative research.
9. Inclusion and exclusion criteria.
10. Sample-size determination.
11. Statistical power.
12. Effect size and sample-size relationship.
13. Randomization.
14. Allocation concealment.
15. Attrition and missing participants.

C. Variables and Measurement

1. Concept of variable.
2. Independent variable.
3. Dependent variable.
4. Extraneous variable.
5. Confounding variable.
6. Control variable.
7. Moderator and mediator variables.
8. Latent and observed variables.
9. Operationalization of variables.
10. Levels of measurement:
 - o Nominal
 - o Ordinal
 - o Interval
 - o Ratio

D. Research Tools and Measurement

1. Tests and measurements.
2. Questionnaires.
3. Interviews.
4. Observation schedules.
5. Rating scales.
6. Psychological inventories.
7. Physiological measurements.
8. Anthropometric measurements.
9. Motor fitness tests.
10. Skill-performance tests.
11. Sports-performance analysis.
12. Biomechanical measurements.
13. Wearable and technology-based measurement.
14. Standardized versus researcher-developed instruments.

E. Validity, Reliability and Objectivity

1. Face validity.
2. Content validity.
3. Criterion-related validity.
4. Construct validity.
5. Concurrent and predictive validity.
6. Test-retest reliability.
7. Inter-rater reliability.
8. Intra-rater reliability.
9. Internal consistency.
10. Measurement error.
11. Standard error of measurement.
12. Objectivity.
13. Pilot study.
14. Instrument standardization.
15. Equipment calibration.

F. Research Application

Scholars shall prepare a methodological plan identifying:

- population;
- sample;
- sampling method;
- variables;
- instruments;
- validity;
- reliability;
- ethical safeguards; and
- data-collection procedure

for their proposed doctoral research.

UNIT–III

DATA COLLECTION, QUANTITATIVE AND QUALITATIVE DATA ANALYSIS

25 Marks

A. Data Collection

1. Primary and secondary data.
2. Principles of systematic data collection.
3. Standardization of data-collection procedures.
4. Pilot testing.
5. Field testing.
6. Experimental data collection.
7. Survey data collection.
8. Interview and focus-group data.
9. Observation.
10. Digital and technology-assisted data collection.
11. Physiological and biomechanical data.
12. Anthropometric and fitness data.
13. Data quality assurance.
14. Data coding.
15. Data entry.
16. Data cleaning.
17. Missing data.
18. Outliers.
19. Data security and storage.

B. Descriptive Statistics

1. Frequency distribution.
2. Percentage.
3. Mean.
4. Median.
5. Mode.
6. Range.
7. Quartiles.
8. Variance.
9. Standard deviation.
10. Coefficient of variation.
11. Percentiles.
12. Graphical and tabular presentation.

C. Probability and Statistical Inference

1. Probability concepts.
2. Sampling distributions.
3. Standard error.
4. Normal distribution.
5. Central Limit Theorem – introductory understanding.

6. Confidence intervals.
7. Null and alternative hypotheses.
8. Level of significance.
9. p-value.
10. Type I and Type II errors.
11. Statistical power.
12. One-tailed and two-tailed testing.

D. Inferential Statistics

1. z-test – conceptual application.
2. Independent-samples t-test.
3. Paired-samples t-test.
4. One-way ANOVA.
5. Factorial ANOVA – introductory application.
6. Repeated-measures ANOVA – introductory application.
7. ANCOVA – introductory concept.
8. Chi-square test.
9. Pearson correlation.
10. Spearman rank correlation.
11. Simple regression.
12. Multiple regression – introductory concept.
13. Non-parametric alternatives.
14. Effect size.
15. Confidence intervals.
16. Statistical significance versus practical significance.

E. Advanced Statistical Concepts – Introductory Doctoral Level

1. Multivariate analysis – overview.
2. MANOVA – concept.
3. Factor analysis – concept.
4. Principal Component Analysis – concept.
5. Logistic regression – concept.
6. Structural equation modelling – introductory concept.
7. Mediation and moderation – introductory concept.
8. Meta-analysis – introductory concept.
9. Meta-analytic effect size – basic understanding.

F. Qualitative Data Analysis

1. Preparation and organization of qualitative data.
2. Transcription.
3. Familiarization with data.
4. Coding.
5. Open and focused coding.
6. Categorization.
7. Theme development.
8. Thematic analysis.
9. Content analysis.

10. Narrative analysis.
11. Constant comparison.
12. Triangulation.
13. Reflexivity.
14. Credibility.
15. Transferability.
16. Dependability.
17. Confirmability.

G. Mixed-Methods Data Analysis

1. Rationale for mixed-method analysis.
2. Integration of quantitative and qualitative findings.
3. Connecting datasets.
4. Merging results.
5. Joint displays.
6. Interpretation of convergent and divergent findings.

UNIT-IV

COMPUTER APPLICATIONS, RESEARCH ETHICS, INTERPRETATION AND SCHOLARLY REPORTING

25 Marks

A. Computer and Digital Applications in Research

1. Role of computers in research.
2. Electronic literature searching.
3. Digital libraries and scholarly databases.
4. Research data management.
5. Spreadsheet applications.
6. Data entry and coding.
7. Data cleaning.
8. Statistical software.
9. Reference-management software.
10. Presentation software.
11. Preparation of tables and figures.
12. Data visualization.
13. Research repositories.
14. Cloud-based research collaboration.
15. Data backup and security.

B. Statistical and Research Software

Scholars shall receive practical orientation in appropriate software such as:

- Microsoft Excel
- IBM SPSS Statistics
- R

- Jamovi/JASP or equivalent
- Qualitative-data analysis software – introductory exposure
- Reference-management applications

Emphasis shall be placed on **selecting the correct statistical procedure and interpreting the output**, rather than merely operating software.

C. Research Ethics and Academic Integrity

1. Meaning and principles of research ethics.
2. Responsible conduct of research.
3. Respect for research participants.
4. Informed consent.
5. Voluntary participation.
6. Right to withdraw.
7. Confidentiality and anonymity.
8. Privacy and data protection.
9. Risk-benefit assessment.
10. Ethics Committee/Institutional Ethics Committee.
11. Ethical issues in exercise and sports research.
12. Research involving children and vulnerable groups.
13. Research involving athletes.
14. Fabrication.
15. Falsification.
16. Plagiarism.
17. Self-plagiarism.
18. Duplicate publication.
19. Salami publication.
20. Authorship and contributorship.
21. Conflict of interest.
22. Citation ethics.
23. Peer-review ethics.
24. Predatory publishing.
25. Retraction and correction.
26. Responsible use of artificial intelligence in research.
27. Research transparency and reproducibility.

D. Interpretation of Research Findings

1. Meaning and purpose of interpretation.
2. Principles of scientific interpretation.
3. Interpretation of descriptive statistics.
4. Interpretation of inferential statistics.
5. Interpretation of effect sizes.
6. Confidence intervals.
7. Statistical versus practical significance.
8. Relationship between findings and hypotheses.
9. Comparison with previous research.
10. Explanation of unexpected findings.
11. Alternative explanations.

12. Generalization.
13. Limitations.
14. Strengths of the study.
15. Implications for theory and practice.
16. Recommendations for future research.

E. Research Report and Scholarly Writing

1. Structure of a research report.
2. Title.
3. Abstract.
4. Introduction.
5. Statement of the problem.
6. Need and significance.
7. Objectives.
8. Research questions.
9. Hypotheses.
10. Operational definitions.
11. Delimitations.
12. Limitations.
13. Assumptions.
14. Review of literature.
15. Theoretical/conceptual framework.
16. Methodology.
17. Results.
18. Discussion.
19. Conclusions.
20. Recommendations.
21. References.
22. Appendices.
23. Tables and figures.
24. Research article.
25. Research proposal.
26. Thesis/dissertation.
27. Conference paper.
28. Poster presentation.
29. Oral presentation.
30. Viva voce/defence.

F. Scholarly Dissemination

1. Selection of appropriate journals.
2. Journal scope and relevance.
3. Peer-reviewed publication.
4. Open-access publishing.
5. DOI and persistent identifiers.
6. Researcher profiles and scholarly identity.
7. ORCID.
8. Citation databases.
9. Responsible dissemination of findings.

10. Research communication to academic and non-academic audiences.

5. UNIT-WISE MARK DISTRIBUTION

Unit	Major Content Area	Marks
Unit I	Foundations of Scientific Research, Research Problem and Literature Review	25
Unit II	Research Design, Sampling, Variables and Measurement	25
Unit III	Data Collection, Quantitative and Qualitative Data Analysis	25
Unit IV	Computer Applications, Research Ethics, Interpretation and Scholarly Reporting	25
TOTAL		100

6. SUGGESTED 4-CREDIT TEACHING DISTRIBUTION

Unit	Suggested Hours
Unit I	15
Unit II	15
Unit III	18
Unit IV	12
Total	60 Hours

Additional practical/research work may be assigned outside formal contact hours.

7. DOCTORAL RESEARCH PRACTICAL COMPONENT

The course shall be research-output oriented. Each scholar should complete the following:

Assignment I – Research Problem

Prepare:

- proposed title;
- background;
- research problem;
- research gap;
- significance;
- objectives;
- research questions;
- hypotheses;
- variables;
- operational definitions.

Assignment II – Critical Literature Review

Critically review a suitable body of recent scholarly literature and prepare a literature matrix containing:

Author/Year	Purpose	Design	Sample	Variables	Tools	Statistics	Major Findings	Limitations	Research Gap
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Assignment III – Research Design

Prepare a methodological framework containing:

- research paradigm;
- research approach;
- research design;
- population;
- sample;
- sampling method;
- variables;
- instruments;
- validity;
- reliability;
- data-collection procedure;
- ethical safeguards.

Assignment IV – Data Analysis

Using an appropriate research dataset, demonstrate:

- data coding;
- data cleaning;
- descriptive statistics;
- appropriate inferential analysis;
- effect size where applicable;
- graphical presentation;
- interpretation.

Assignment V – Mini Research Proposal

Each scholar shall prepare a research proposal containing:

1. Title
2. Introduction
3. Background
4. Statement of problem
5. Need and significance
6. Research gap
7. Objectives
8. Research questions
9. Hypotheses

10. Variables
11. Operational definitions
12. Review of literature
13. Conceptual/theoretical framework
14. Methodology
15. Population and sample
16. Sampling procedure
17. Research tools
18. Validity and reliability
19. Data-collection procedure
20. Statistical techniques
21. Ethical considerations
22. Expected outcomes
23. References

8. SUGGESTED QUESTION PAPER BLUEPRINT – 100 MARKS

The assessment should test **doctoral research competence**, rather than simple memorization.

Section	Type of Questions	Marks
A	Objective/very short answer	10
B	Short analytical answers	20
C	Descriptive/critical answers	30
D	Long analytical/research-design questions	20
E	Research application/case/data-analysis questions	20
Total		100

Alternative Unit-Based Distribution

- Unit I – 25 marks
- Unit II – 25 marks
- Unit III – 25 marks
- Unit IV – 25 marks

Questions should progressively assess:

Knowledge → Understanding → Application → Analysis → Evaluation → Creation

9. RECOMMENDED BLOOM'S TAXONOMY DISTRIBUTION

Cognitive Level	Suggested Weightage
Remember	10%
Understand	15%
Apply	25%
Analyze	25%
Evaluate	15%

Create	10%
Total	100%

The emphasis should therefore be on **application, analysis and evaluation**, consistent with doctoral-level research preparation.

10. RESEARCH COMPETENCY FRAMEWORK

The course shall develop the following sequential research competencies:

Identify Research Problem

↓

Critically Review Literature

↓

Establish Research Gap

↓

Formulate Research Questions/Objectives/Hypotheses

↓

Select Research Paradigm & Design

↓

Determine Population & Sample

↓

Select/Develop Research Instruments

↓

Establish Validity & Reliability

↓

Obtain Ethical Approval

↓

Collect Data

↓

Manage & Clean Data

↓

Analyse Data

↓

Interpret Findings

↓

Discuss with Existing Evidence

↓

Draw Conclusions

↓

Prepare Thesis/Article

↓

Present & Disseminate Research

11. EXPECTED DOCTORAL COMPETENCIES

On completion of C-1, the scholar should be capable of independently:

1. Identifying a meaningful research problem.

2. Conducting a rigorous literature search.
3. Establishing a defensible research gap.
4. Selecting an appropriate research paradigm.
5. Designing a scientifically appropriate study.
6. Determining an appropriate sample.
7. Selecting or developing valid and reliable instruments.
8. Conducting ethical data collection.
9. Managing research datasets.
10. Selecting appropriate statistical methods.
11. Conducting basic quantitative and qualitative analysis.
12. Interpreting research findings.
13. Critically comparing findings with existing evidence.
14. Recognizing methodological limitations.
15. Preparing a doctoral research proposal.
16. Preparing research articles and scholarly reports.
17. Demonstrating research integrity and academic honesty.
18. Defending methodological decisions before a research committee.

12. RECOMMENDED TEACHING-LEARNING METHODS

The course shall employ:

- Lectures and interactive discussions.
- Research-method workshops.
- Journal-club activities.
- Critical appraisal of published research.
- Case studies.
- Statistical-data exercises.
- Research software demonstrations.
- Literature-search exercises.
- Proposal-development workshops.
- Peer review.
- Research presentations.
- Mock doctoral research presentations.
- Problem-based learning.

13. RECOMMENDED INDIAN REFERENCES

1. Kothari, C. R., &Garg, G.

Kothari, C. R., &Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International Publishers.

Publisher: New Age International Publishers

Address: 7/30-A, Daryaganj, New Delhi 110002, India.

2. Kumar, R.

Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners* (5th ed.). SAGE Publications.

Publisher: SAGE Publications India Pvt. Ltd.

Address: B1/I-1, Mohan Cooperative Industrial Area, Mathura Road, New Delhi 110044, India.

3. Singh, Y. K.

Singh, Y. K. (2006). *Fundamental of research methodology and statistics*. New Age International Publishers.

Publisher: New Age International Publishers

Address: 7/30-A, Daryaganj, New Delhi 110002, India.

4. Singh, A. K.

Singh, A. K. (2006). *Tests, measurements and research methods in behavioural sciences*. BharatiBhawan Publishers & Distributors.

Publisher: BharatiBhawan Publishers & Distributors

Address: 1232, Ashok Rajpath, Patna 800004, Bihar, India.

5. Verma, J. P.

Verma, J. P. (2016). *A textbook on sports statistics*. Sports Publication.

Publisher: Sports Publication

Address: 4262/3, Ansari Road, Daryaganj, New Delhi 110002, India.

14. INTERNATIONAL REFERENCES

1. Creswell, J. W., & Creswell, J. D.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Publisher: SAGE Publications, Inc.

Address: 2455 Teller Road, Thousand Oaks, CA 91320, USA.

2. Thomas, J. R., Nelson, J. K., & Silverman, S. J.

Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2015). *Research methods in physical activity* (7th ed.). Human Kinetics.

Publisher: Human Kinetics

Address: P.O. Box 5076, Champaign, IL 61825-5076, USA.

3. Cohen, L., Manion, L., & Morrison, K.

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (8th ed.). Routledge.

Publisher: Routledge

Address: 711 Third Avenue, New York, NY 10017, USA.

4. Fraenkel, J. R., Wallen, N. E., & Hyun, H. H.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill Education.

Publisher: McGraw-Hill Education

Address: 2 Penn Plaza, New York, NY 10121, USA.

5. Gratton, C., & Jones, I.

Gratton, C., & Jones, I. (2010). *Research methods for sports studies* (2nd ed.). Routledge.

Publisher: Routledge

Address: 711 Third Avenue, New York, NY 10017, USA.

6. Vincent, W. J., & Weir, J. P.

Vincent, W. J., & Weir, J. P. (2012). *Statistics in kinesiology* (4th ed.). Human Kinetics.

Publisher: Human Kinetics

Address: P.O. Box 5076, Champaign, IL 61825-5076, USA.

7. Field, A.

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.

Publisher: SAGE Publications Ltd.

Address: 1 Oliver's Yard, 55 City Road, London EC1Y 1SP, United Kingdom.

8. Patton, M. Q.

Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). SAGE Publications.

Publisher: SAGE Publications, Inc.

Address: 2455 Teller Road, Thousand Oaks, CA 91320, USA.

9. Braun, V., & Clarke, V.

Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE Publications.

Publisher: SAGE Publications Ltd.

Address: 1 Oliver's Yard, 55 City Road, London EC1Y 1SP, United Kingdom.

10. American Psychological Association.

American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). American Psychological Association.

Publisher: American Psychological Association

Address: 750 First Street NE, Washington, DC 20002, USA.

15. CORE REFERENCES

For official syllabus purposes, the following may be designated as **Core References**:

1. Kothari & Garg – *Research Methodology: Methods and Techniques*
2. Creswell & Creswell – *Research Design*
3. Thomas, Nelson & Silverman – *Research Methods in Physical Activity*
4. Fraenkel, Wallen & Hyun – *How to Design and Evaluate Research in Education*
5. Cohen, Manion & Morrison – *Research Methods in Education*
6. Gratton & Jones – *Research Methods for Sports Studies*
7. Vincent & Weir – *Statistics in Kinesiology*
8. Field – *Discovering Statistics Using IBM SPSS Statistics*
9. Patton – *Qualitative Research & Evaluation Methods*
10. American Psychological Association – *Publication Manual*

16. CURRICULUM DESIGN PHILOSOPHY

The four units are deliberately arranged as a **doctoral research-development pathway**:

UNIT-I — WHY AND WHAT TO RESEARCH?

Research Philosophy → Research Problem → Research Gap → Literature → Questions → Objectives → Hypotheses

↓

UNIT-II — HOW WILL THE RESEARCH BE DESIGNED?

Research Paradigm → Design → Population → Sampling → Variables → Measurement → Validity → Reliability

↓

UNIT-III — HOW WILL THE EVIDENCE BE GENERATED AND ANALYSED?

Data Collection → Data Management → Quantitative Analysis → Qualitative Analysis → Mixed-Methods Integration

↓

UNIT-IV — HOW WILL THE RESEARCH BE VERIFIED, INTERPRETED AND COMMUNICATED?

Computer Applications → Research Ethics → Interpretation → Scholarly Writing → Publication → Dissemination

FINAL COURSE OUTCOME

The overall objective of C-1 is to move the doctoral scholar from:

“KNOWING ABOUT RESEARCH”

to

“BEING CAPABLE OF DESIGNING, CONDUCTING, ANALYSING, DEFENDING AND COMMUNICATING INDEPENDENT RESEARCH.”

COURSE-2 (C-2)**RESEARCH PROPOSAL, LITERATURE REVIEW, THESIS EVALUATION AND RESEARCH SEMINAR IN PHYSICAL EDUCATION AND SPORTS SCIENCES****Course Structure**

Particular	Details
Course Code	C-2
Course Title	Research Proposal, Literature Review, Thesis Evaluation and Research Seminar in Physical Education and Sports Sciences
Credits	3 Credits
Total Marks	30 Marks
Number of Units	3 Units
Credits per Unit	1 Credit
Marks per Unit	10 Marks
Suggested Teaching Hours	45 Hours
Nature of Course	Research Skill Development / Core Course
Discipline	Physical Education and Sports Sciences

1. COURSE RATIONALE

Research competency in Physical Education and Sports Sciences requires more than an understanding of research methodology. A Ph.D. scholar must be able to understand and critically examine a research problem, evaluate a research proposal, assess the quality of published literature, critically evaluate a thesis or dissertation, understand the standards of doctoral research, and communicate scientific knowledge effectively.

The present course is therefore designed as a **research appraisal and academic communication course rather than a project-submission course.**

The course provides a systematic progression:

Research Problem → Research Proposal → Literature Review → Research Methodology → Research Evaluation → Thesis Evaluation → Scientific Seminar → Viva-Voce

Special emphasis shall be given to research areas relevant to Physical Education and Sports Sciences, including:

- Exercise Physiology
- Sports Training
- Sports Psychology
- Sports Biomechanics and Kinesiology
- Sports Medicine
- Test, Measurement and Evaluation

- Physical Fitness and Wellness
- Yoga and Health
- Adapted Physical Education
- Physical Literacy
- Sports Nutrition
- Motor Learning and Motor Development
- Talent Identification and Development
- Sports Performance Analysis
- Technology and Artificial Intelligence in Sports
- Physical Activity and Public Health

The course shall not require students to prepare or submit an independent research project. Evaluation shall be based on **classroom activities, critical appraisal exercises, thesis/research-paper evaluation exercises, seminar presentation and written/internal assessment.**

2. COURSE OBJECTIVES

After completing the course, the learner will be able to:

1. Understand the structure and essential components of a research proposal.
2. Identify and critically examine a research problem in Physical Education and Sports Sciences.
3. Understand the process of formulating research questions, objectives and hypotheses.
4. Critically review and synthesize research literature.
5. Identify research gaps from published studies.
6. Understand different approaches to literature review and research synthesis.
7. Critically evaluate research methodology, tools, sampling and statistical procedures.
8. Understand the principles and criteria used for evaluating a Ph.D. thesis.
9. Assess the quality, originality, validity and contribution of doctoral research.
10. Understand the preparation and structure of a Ph.D. thesis evaluation report.
11. Develop skills in scientific seminar presentation.
12. Develop effective academic communication and question-answer skills.
13. Understand publication ethics, plagiarism, academic integrity and responsible research practices.
14. Develop the ability to distinguish scientifically supported evidence from unsupported claims.

3. COURSE LEARNING OUTCOMES

At the completion of the course, the learner will be able to:

CLO1: Explain the essential components of a research proposal in Physical Education and Sports Sciences.

CLO2: Critically examine research problems, objectives, hypotheses and research questions.

CLO3: Search, classify, analyze and critically synthesize relevant research literature.

CLO4: Identify research gaps and assess the relevance and originality of research.

CLO5: Evaluate the appropriateness of research design, sampling, tools, procedures and statistical techniques.

CLO6: Understand and apply appropriate criteria for evaluating a Ph.D. thesis.

CLO7: Prepare a reasoned academic evaluation of the quality, content and presentation of research work.

CLO8: Deliver a scientifically organized seminar on an emerging issue in Physical Education and Sports Sciences.

CLO9: Demonstrate academic integrity, ethical writing and appropriate referencing practices.

CLO10: Defend and communicate research-related ideas effectively during academic discussion and viva-voce.

UNIT-I

RESEARCH PROPOSAL AND RESEARCH DESIGN IN PHYSICAL EDUCATION AND SPORTS SCIENCES

1 Credit | 10 Marks

A. Research Proposal: Concept and Purpose

1. Meaning and definition of a research proposal.
2. Purpose and importance of a research proposal.
3. Characteristics of a good research proposal.
4. Difference between a research proposal, research report, dissertation and thesis.
5. Characteristics of a scientifically sound research proposal.
6. Components of a research proposal.
7. Criteria for evaluating a research proposal.

B. Identification and Formulation of the Research Problem

1. Sources of research problems in Physical Education and Sports Sciences.
2. Identification of researchable problems.
3. Current issues in Physical Education and Sports Sciences.
4. Problem statement.
5. Need and significance of the study.
6. Delimitations and limitations.
7. Operational definitions.
8. Identification of research gaps.
9. Research questions.
10. Formulation of aim and objectives.
11. Formulation and evaluation of hypotheses.

C. Research Design

1. Meaning and purpose of research design.
2. Experimental research design.
3. Quasi-experimental research.
4. Descriptive research.
5. Survey research.
6. Correlational research.
7. Ex-post-facto research.
8. Comparative research.
9. Qualitative research.
10. Mixed-method research.
11. Longitudinal and cross-sectional approaches.
12. Selection of an appropriate research design for Physical Education and Sports Sciences.

D. Variables and Research Framework

1. Independent and dependent variables.
2. Extraneous and confounding variables.
3. Control variables.
4. Intervening variables.
5. Conceptual framework.
6. Theoretical framework.
7. Relationship between objectives, variables, hypotheses and methodology.

E. Methodological Appraisal of a Research Proposal

Students shall be introduced to the evaluation of:

- appropriateness of research design;
- population and sample;
- sampling technique;
- adequacy of sample size;
- selection of variables;
- suitability of research tools;
- validity and reliability;
- data collection procedures;
- experimental/intervention protocols;
- ethical considerations;
- statistical procedures;
- feasibility of the proposed research.

F. Evaluation of a Research Proposal

The following criteria shall be discussed:

1. Clarity of title.
2. Relevance of the research problem.
3. Originality and novelty.
4. Research gap.
5. Clarity of objectives.

6. Appropriateness of hypotheses/research questions.
7. Adequacy of literature review.
8. Methodological soundness.
9. Feasibility.
10. Ethical acceptability.
11. Expected contribution to Physical Education and Sports Sciences.
12. Quality and adequacy of references.
13. **Suggested Classroom Evaluation Activity**

Students shall be provided with sample research proposals/research abstracts and shall be guided to **critically evaluate their strengths, weaknesses, methodological appropriateness and research potential.**

No research proposal/project shall be required to be submitted by the student.

UNIT-II

REVIEW OF LITERATURE, CRITICAL APPRAISAL AND EVALUATION OF RESEARCH WORK

1 Credit | 10 Marks

A. Review of Literature

1. Meaning and purpose of literature review.
2. Importance of literature review in research.
3. Primary and secondary sources.
4. Research articles, review articles, theses, dissertations, books and conference proceedings.
5. Scholarly and non-scholarly sources.
6. Identification of relevant literature.
7. Organization of literature according to themes, variables, methods and chronology.
8. Literature synthesis versus literature summary.
9. Identification of research gaps.
10. Development of a conceptual understanding from literature.

B. Literature Search in Physical Education and Sports Sciences

Introduction to:

- Google Scholar
- PubMed/MEDLINE
- Scopus
- Web of Science
- SPORTDiscus
- ERIC
- ScienceDirect
- institutional repositories
- university digital libraries

Search Techniques

1. Keywords and key concepts.
2. Boolean operators – AND, OR, NOT.
3. Phrase searching.
4. Truncation.
5. Citation tracking.
6. Reference chaining.
7. Author-based searches.
8. Journal-based searches.
9. Identification of peer-reviewed literature.

C. Critical Appraisal of Research Articles

Students shall learn to examine a research article with reference to:

1. Title.
2. Abstract.
3. Introduction.
4. Statement of the problem.
5. Research gap.
6. Objectives.
7. Hypotheses/research questions.
8. Review of literature.
9. Research design.
10. Participants/sample.
11. Variables.
12. Research tools.
13. Validity and reliability.
14. Data collection procedure.
15. Statistical techniques.
16. Results.
17. Discussion.
18. Conclusions.
19. Limitations.
20. Practical implications.
21. References.
22. Originality and contribution.

D. Review Research

Introduction to:

1. Narrative review.
2. Systematic review.
3. Scoping review.
4. Integrative review.
5. Meta-analysis – basic concept.
6. Umbrella review – basic concept.
7. Evidence synthesis.

8. PRISMA guidelines – introductory understanding.

E. Evaluation of a Ph.D. Thesis

The following dimensions of doctoral thesis evaluation shall be discussed in detail:

Quality

1. Introduction to the work.
2. Review of Literature.
3. Scope of work.
4. Technical soundness.
5. Research methodology and experimental set-up.
6. Clarity of problem statement.
7. Originality of work.
8. Timeliness of research.
9. Contribution to the field.
10. Conclusions drawn.
11. Scope for further research.

Content

12. Adequacy of data and information.
13. Organization of the thesis.
14. Practical applications and utility.
15. Adequacy and quality of references/bibliography.

Presentation

16. Clarity of explanation.
17. Adequacy of methodological details.
18. Justification of the work undertaken.
19. Clarity and ambiguity-free language.
20. Clarity of objectives.
21. Freedom from redundant, irrelevant material and errors.

F. Preparation of a Thesis Evaluation Report

Students shall understand the structure of a formal thesis evaluation report, including:

1. General assessment.
2. Chapter-wise assessment.
3. Assessment of research methodology.
4. Assessment of statistical analysis.
5. Assessment of originality.
6. Assessment of contribution to the discipline.
7. Assessment of practical utility.
8. Assessment of references.
9. Major strengths.
10. Minor shortcomings.

11. Overall academic assessment.
12. Final recommendation.

The possible recommendations shall be discussed:

- acceptable in present form;
- acceptable subject to minor corrections;
- revision and resubmission;
- not acceptable.

The principles governing a **fair, objective, evidence-based and academically defensible examiner's report** shall be emphasized.

Suggested Classroom Evaluation Activity

Students shall be provided with a **sample research article, dissertation/thesis chapter or anonymized research report** and guided to critically appraise it using the prescribed criteria.

This is an evaluation exercise only; students shall not be required to submit a project or independent thesis evaluation report as a course project.

UNIT–III

RESEARCH SEMINAR, SCIENTIFIC COMMUNICATION AND VIVA-VOCE

1 Credit | 10 Marks

A. Research Seminar

1. Meaning and purpose of a research seminar.
2. Importance of seminars in doctoral research.
3. Seminar versus lecture.
4. Seminar versus conference presentation.
5. Seminar as a mechanism of scholarly communication.
6. Selection of a contemporary research topic.
7. Identification of scientifically important issues.
8. Use of evidence in academic presentation.

B. Seminar Topics in Physical Education and Sports Sciences

Contemporary areas may include:

Exercise Physiology

- Exercise and cardiovascular adaptation.
- HIIT and metabolic adaptation.
- Exercise and immune function.
- Exercise and cognitive function.

Sports Training

- Periodization and training adaptation.
- Strength and conditioning.
- Training-load monitoring.
- Youth athletic development.

Sports Biomechanics and Kinesiology

- Biomechanical determinants of sports performance.
- Movement analysis.
- Wearable sensors.
- Artificial intelligence in sports biomechanics.

Sports Psychology

- Mental toughness.
- Competitive anxiety.
- Psychological skills training.
- Athlete burnout.

Sports Medicine

- Sports injury prevention.
- Concussion management.
- Return-to-play protocols.
- Recovery and overtraining.

Test, Measurement and Evaluation

- Fitness assessment.
- Athlete profiling.
- Validity and reliability.
- Technology-based assessment.

Physical Education

- Physical literacy.
- Inclusive Physical Education.
- Physical activity and academic performance.
- Technology in Physical Education.

Other Emerging Areas

- Sports nutrition.
- Talent identification.
- Adapted Physical Activity.
- Yoga and wellness.
- Women in sports.
- Physical activity and public health.
- Sports analytics.
- Artificial Intelligence and technology in sports.

C. Structure of Scientific Seminar

A scientific seminar should normally include:

1. Title.
2. Introduction/background.
3. Research problem or central issue.
4. Need and significance.
5. Relevant literature/evidence.
6. Research gap or unresolved issue.
7. Major findings/evidence.
8. Critical discussion.
9. Practical implications.
10. Future research directions.
11. Conclusion.
12. References.

D. Scientific Presentation Skills

1. Organization of content.
2. Logical sequencing.
3. Scientific terminology.
4. Effective opening and closing.
5. Voice modulation.
6. Appropriate pace.
7. Eye contact.
8. Professional body language.
9. Effective PowerPoint design.
10. Appropriate use of tables, graphs and figures.
11. Presentation of statistical findings.
12. Avoidance of excessive text.
13. Time management.
14. Summarization of key messages.

E. Question–Answer and Viva-Voce Skills

Students shall learn to:

1. Listen carefully to questions.
2. Understand the question before answering.
3. Answer precisely and logically.
4. Support answers with evidence.
5. Differentiate evidence from personal opinion.
6. Admit limitations when appropriate.
7. Respond to criticism professionally.
8. Handle difficult questions.
9. Avoid unsupported claims.
10. Maintain academic professionalism.

F. Research Ethics and Academic Integrity

1. Meaning of research integrity.
2. Academic honesty.
3. Plagiarism.
4. Self-plagiarism.
5. Fabrication and falsification.
6. Duplicate publication.
7. Authorship and contributorship.
8. Conflict of interest.
9. Ethical treatment of human participants.
10. Informed consent.
11. Confidentiality.
12. Responsible use of artificial intelligence in academic work.
13. Citation and acknowledgement.
14. Ethical responsibilities of researchers, reviewers and examiners.

G. Evaluation of Research Seminar

The seminar shall be evaluated with reference to:

1. Relevance of topic.
2. Scientific accuracy.
3. Quality of literature/evidence.
4. Critical analysis.
5. Organization.
6. Clarity of explanation.
7. Presentation skills.
8. Use of visual material.
9. Ability to answer questions.
10. Time management.

4. CREDIT AND MARK DISTRIBUTION

Unit	Component	Credit	Marks
Unit-I	Research Proposal and Research Design	1	10
Unit-II	Review of Literature, Critical Appraisal and Thesis Evaluation	1	10
Unit-III	Research Seminar, Scientific Communication and Viva-Voce	1	10
Total		3	30

5. TEACHING-LEARNING HOURS

Unit	Theory/Discussion	Practical/Academic Exercise	Total
Unit-I	8 Hours	7 Hours	15
Unit-II	8 Hours	7 Hours	15
Unit-III	6 Hours	9 Hours	15
Total	22 Hours	23 Hours	45 Hours

The practical/academic component shall consist of **guided classroom exercises, critical appraisal, evaluation of sample research material, discussions, seminar presentation and viva-voce exercises**. It shall not constitute a project-submission requirement.

6. INTERNAL / CONTINUOUS EVALUATION

UNIT-I – Research Proposal and Research Design: 10 Marks

Evaluation Component	Marks
Understanding of research problem and objectives	2
Critical appraisal of research design	2
Evaluation of variables, sampling and research tools	2
Evaluation of validity, reliability and statistical procedures	2
Class participation/discussion and analytical response	2
Total	10

UNIT-II – Literature Review and Thesis Evaluation: 10 Marks

Evaluation Component	Marks
Literature search and identification of relevant studies	2
Critical appraisal of selected research literature	2
Identification of research gaps	2
Understanding of Ph.D. thesis evaluation criteria	2
Analytical discussion/classroom evaluation exercise	2
Total	10

UNIT-III – Research Seminar and Viva-Voce: 10 Marks

Evaluation Component	Marks
Selection and relevance of research topic	1
Scientific content and accuracy	2
Literature/evidence and critical analysis	2
Organization and clarity	1
Scientific presentation skills	2
Question-answer/viva-voce performance	1
Time management	1
Total	10

7. IMPORTANT NOTE ON COURSE ASSESSMENT

This course is **not intended to require the student to submit a research project, research proposal, review article, dissertation or thesis**.

The terms “proposal writing”, “review research” and “thesis evaluation” in this curriculum refer to the **teaching, learning, critical appraisal and evaluation of research processes**.

Assessment shall be based upon:

- classroom discussion;
- critical appraisal exercises;
- analysis of sample research proposals;
- evaluation of research articles;
- identification of research gaps;
- analysis of research methodology;
- guided thesis-evaluation exercises;
- seminar presentation;
- question-answer/viva-voce;
- continuous internal assessment.

The purpose is to develop the **researcher’s ability to read, understand, analyze, evaluate and communicate research**, rather than to impose an additional project requirement during Pre-Ph.D. Course Work.

8. SUGGESTED TEACHING–LEARNING METHODS

The following approaches are recommended:

1. Research-oriented lectures.
2. Research paper reading.
3. Journal-club discussions.
4. Critical appraisal exercises.
5. Case studies.
6. Group discussions.
7. Thesis chapter analysis.
8. Research methodology critique.
9. Statistical interpretation exercises.
10. Mock thesis evaluation.
11. Mock viva-voce.
12. Scientific seminar presentations.
13. Peer discussion and academic feedback.
14. Database-search demonstrations.
15. Plagiarism and publication-ethics exercises.

9. SUGGESTED CORE REFERENCES

1. Kothari, C. R., & Garg, G. – *Research Methodology: Methods and Techniques*.
2. Kumar, R. – *Research Methodology: A Step-by-Step Guide for Beginners*.
3. Creswell, J. W., & Creswell, J. D. – *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*.
4. Thomas, J. R., Nelson, J. K., & Silverman, S. J. – *Research Methods in Physical Activity*.
5. Verma, J. P. – *A Textbook on Sports Statistics*.
6. Singh, A. K. – *Tests, Measurements and Research Methods in Behavioural Sciences*.

7. Hart, C. – *Doing a Literature Review: Releasing the Research Imagination*.
8. Booth, W. C., Colomb, G. G., & Williams, J. M. – *The Craft of Research*.
9. American Psychological Association – *Publication Manual of the American Psychological Association* (7th ed.).
10. Page, M. J., et al. – PRISMA 2020 guidelines for systematic reviews.

10. COURSE STRUCTURE AT A GLANCE

UNIT-I — UNDERSTAND AND EVALUATE THE RESEARCH PROPOSAL

Research Problem → Objectives → Hypotheses → Research Design → Variables → Sampling → Tools → Data Collection → Statistics → Ethics → Evaluation

1 Credit | 10 Marks

UNIT-II — REVIEW AND EVALUATE RESEARCH

Literature Search → Critical Appraisal → Synthesis → Research Gap → Methodological Evaluation → Thesis Evaluation → Examiner's Report

1 Credit | 10 Marks

UNIT-III — COMMUNICATE AND DEFEND RESEARCH

Research Evidence → Scientific Seminar → Presentation → Discussion → Question & Answer → Viva-Voce

1 Credit | 10 Marks

Overall Academic Progression

UNDERSTAND → ANALYSE → CRITICALLY EVALUATE → COMMUNICATE → DEFEND

This structure is specifically designed for **Pre-Ph.D. Course Work in Physical Education and Sports Sciences** and emphasizes the development of researcher's and future supervisor's/examiner's competencies without creating an additional project-submission burden for the scholar.

This version is deliberately different from the uploaded document's original **“production-oriented” approach**. The original document explicitly expected students to produce a funding proposal, review manuscript and seminar as three tangible outputs. The redrafted version instead makes **research appraisal, thesis evaluation and academic competency** the focus, while retaining the original **3-credit/30-mark/three-unit framework**.

PRE-Ph.D. COURSE WORK

COURSE–III (C–3): SUBJECT-SPECIFIC STUDIES IN PHYSICAL EDUCATION AND SPORTS SCIENCES

Course Code: C–3

Course Title: Subject-Specific Studies in Physical Education and Sports Sciences

Credits: 3

Maximum Marks: 50

Units: 3

Marks: 10 marks First unit and 20 marks for Second unit and Third unit each

Nature: Subject-Specific / Advanced Disciplinary Course

1. COURSE DESCRIPTION

The course is designed to provide Ph.D. scholars with an **advanced, interdisciplinary and research-oriented understanding of Physical Education and Sports Sciences**. It covers major specialized areas of the discipline, contemporary developments, and scientific principles, emerging technologies, research trends and applications.

The course is intended to strengthen the scholar's **subject knowledge and ability to critically evaluate developments and research evidence in Physical Education and Sports Sciences**.

The course shall **not require the submission of a project, research proposal, review article or independent research report**. Evaluation shall be based on subject-specific academic activities, critical analysis, interpretation of research evidence, seminar/discussion and written/oral assessment.

COURSE OBJECTIVES

The course aims to enable Ph.D. scholars to:

1. Develop advanced knowledge of major areas of Physical Education and Sports Sciences.
2. Understand the scientific foundations of human movement, exercise and sports performance.
3. Examine contemporary developments and emerging trends in Physical Education and Sports.
4. Understand interdisciplinary approaches to sports science research.
5. Critically evaluate scientific evidence related to physical activity and sports performance.
6. Understand applications of exercise physiology, biomechanics, sports psychology, sports medicine, nutrition and training science.
7. Examine current issues relating to Physical Education, health, fitness and wellness.
8. Understand technological developments in sports science and performance analysis.
9. Develop the ability to critically discuss subject-specific research findings.
10. Develop advanced scholarly competence appropriate for doctoral-level study in Physical Education and Sports Sciences.

COURSE LEARNING OUTCOMES

After successful completion of the course, the scholar will be able to:

CLO1: Explain advanced concepts and principles in Physical Education and Sports Sciences.

CLO2: Integrate knowledge from different sub-disciplines of Sports Science.

CLO3: Critically examine contemporary research findings in Physical Education and Sports.

CLO4: Evaluate scientific approaches used for assessment of fitness, health and sports performance.

CLO5: Interpret the relevance of physiological, biomechanical, psychological and nutritional factors in sports performance.

CLO6: Discuss contemporary developments in training, physical activity and sports science.

CLO7: Evaluate the practical application and limitations of modern sports science technologies.

CLO8: Demonstrate advanced subject-specific academic communication and critical thinking.

UNIT-I

ADVANCED FOUNDATIONS OF PHYSICAL EDUCATION AND SPORTS SCIENCES

1 Credit – 10 Marks

A. Physical Education as an Academic Discipline

1. Concept, nature and scope of Physical Education.
2. Physical Education as a multidisciplinary and interdisciplinary field.
3. Relationship between Physical Education, Exercise Science and Sports Science.
4. Contemporary role of Physical Education in health and education.
5. Physical literacy and lifelong physical activity.
6. Physical Education, quality of life and well-being.
7. Physical Education and public health.
8. Physical Education in the context of contemporary educational policies.

B. Exercise Science and Human Movement

1. Scientific basis of human movement.
2. Acute and chronic responses to exercise.
3. Principles of training and adaptation.
4. Fitness, health and performance.
5. Exercise intensity, volume, frequency and duration.
6. Individual differences in exercise response.

7. Principles of overload, specificity, progression and reversibility.
8. Recovery and regeneration.

C. Exercise Physiology

1. Cardiovascular responses and adaptations to exercise.
2. Respiratory responses and adaptations.
3. Neuromuscular responses.
4. Energy systems and exercise.
5. Aerobic and anaerobic performance.
6. Strength, power and muscular endurance.
7. Exercise and metabolic adaptations.
8. Thermoregulation and exercise.
9. Exercise at altitude.
10. Exercise and aging.

D. Fitness and Wellness

1. Health-related fitness.
2. Skill-related fitness.
3. Functional fitness.
4. Fitness assessment.
5. Exercise prescription.
6. Physical activity and non-communicable diseases.
7. Sedentary behaviour.
8. Exercise for different populations.

E. Contemporary Issues

- Physical inactivity.
- Childhood obesity.
- Lifestyle-related diseases.
- Exercise adherence.
- Physical activity promotion.
- Fitness for lifelong health.

Evaluation – Unit I

Evaluation shall be based on:

Component	Marks
Subject knowledge	3
Understanding and interpretation	2
Critical analysis	2
Application to Physical Education/Sports	2
Oral/written response	1
Total	10

UNIT-II

ADVANCED SPORTS SCIENCE: PERFORMANCE, ASSESSMENT AND INTERDISCIPLINARY APPROACHES

1 Credit – 20 Marks

A. Sports Training and Performance

1. Principles of sports training.
2. Training adaptation.
3. Periodization and contemporary training models.
4. Strength and conditioning.
5. Development of strength, power, speed, agility and endurance.
6. Training-load monitoring.
7. Internal and external training load.
8. Overtraining and overreaching.
9. Recovery strategies.
10. Youth athlete development.
11. Talent identification and development.
12. Long-term athlete development.

B. Sports Biomechanics and Kinesiology

1. Fundamental concepts of biomechanics.
2. Kinematics and kinetics.
3. Linear and angular motion.
4. Force, torque and power.
5. Balance, stability and coordination.
6. Biomechanical analysis of sports skills.
7. Motion analysis.
8. Video-based performance analysis.
9. Wearable sensors and movement assessment.
10. Application of biomechanics to injury prevention and performance enhancement.

C. Sports Psychology

1. Psychological determinants of sports performance.
2. Motivation.
3. Anxiety and stress.
4. Arousal and performance.
5. Concentration and attention.
6. Self-confidence and self-efficacy.
7. Mental toughness.
8. Psychological skills training.
9. Team cohesion.
10. Athlete burnout.
11. Psychological preparation for competition.

D. Sports Nutrition

1. Energy requirements of athletes.
2. Carbohydrate, protein and fat requirements.
3. Hydration and electrolyte balance.
4. Pre-, during- and post-exercise nutrition.
5. Recovery nutrition.
6. Nutritional strategies for different sports.
7. Functional foods.
8. Ergogenic nutrition.
9. Nutritional assessment.
10. Contemporary issues in sports nutrition.

E. Sports Medicine and Injury Management

1. Common sports injuries.
2. Injury mechanisms.
3. Prevention strategies.
4. Exercise-related musculoskeletal injuries.
5. Rehabilitation principles.
6. Recovery monitoring.
7. Return-to-play.
8. Overuse injuries.
9. Concussion and athlete safety.
10. Injury surveillance.

F. Sports Pedagogy

1. Concept and Foundations of Sports Pedagogy – Meaning, nature, scope and importance of sports pedagogy in Physical Education and sports coaching.
2. Teaching–Learning Process in Sports – Principles of teaching, learning styles, learner-centered approaches and effective instructional practices.
3. Methods and Strategies of Sports Teaching – Direct instruction, demonstration, guided discovery, problem-solving, cooperative learning and game-based approaches.
4. Skill Teaching and Learning – Presentation, progression, practice, feedback, correction and transfer of sports skills.
5. Individual Differences and Learner Development – Age, ability, motivation, readiness, talent and individual differences in sports learning.
6. Technology in Sports Pedagogy – Video analysis, digital learning resources, performance feedback and technology-assisted coaching.
7. Assessment and Feedback in Sports Learning – Formative and summative assessment, skill assessment, performance evaluation and constructive feedback.
8. Inclusive and Safe Sports Pedagogy – Inclusive teaching, adaptations for diverse learners, safety, ethical conduct and athlete welfare.
9. Contemporary Trends in Sports Pedagogy – Competency-based learning, physical literacy, athlete-centered coaching, evidence-based coaching and interdisciplinary approaches.
10. Research in Sports Pedagogy – Current research trends, critical appraisal of pedagogical practices and application of research evidence to sports teaching and coaching.

Evaluation – Unit II

Component	Marks
Understanding of specialized subject matter	6
Integration of different Sports Science disciplines	4
Critical evaluation of evidence	4
Application to sports performance	4
Academic discussion/oral response	2
Total	20

UNIT–III**CONTEMPORARY AND EMERGING AREAS IN PHYSICAL EDUCATION AND SPORTS SCIENCES****1 Credit – 20 Marks**

This unit is specifically intended to expose Ph.D. scholars to **current and emerging areas** of the discipline.

A. Technology in Sports Science

1. Technology-assisted sports training.
2. Wearable technology.
3. GPS and athlete tracking.
4. Heart-rate monitoring.
5. Motion capture.
6. Force platforms.
7. Inertial measurement units.
8. Video and performance analysis.
9. Virtual reality and augmented reality.
10. Digital assessment of physical activity.

B. Artificial Intelligence and Sports

1. Introduction to Artificial Intelligence in Sports.
2. Machine learning and sports analytics.
3. AI-based performance analysis.
4. Predictive analytics.
5. Injury-risk prediction.
6. Talent identification using data analytics.
7. AI-assisted coaching.
8. Ethical issues in AI-based sports decision-making.
9. Human expertise versus automated decision-making.

C. Test, Measurement and Evaluation

1. Principles of assessment.

2. Validity.
3. Reliability.
4. Objectivity.
5. Norm-referenced and criterion-referenced assessment.
6. Standardized fitness tests.
7. Functional movement assessment.
8. Physiological assessment.
9. Psychological assessment.
10. Sports performance profiling.

D. Adapted Physical Education and Inclusive Sports

1. Concept and importance of adapted Physical Education.
2. Classification of disability.
3. Inclusive Physical Education.
4. Adapted sports.
5. Para-sports.
6. Modification of activities and equipment.
7. Assessment of individuals with disabilities.
8. Inclusive curriculum development.
9. Barriers to participation.
10. Universal design in Physical Education.

E. Yoga, Wellness and Holistic Health

1. Yoga and physical health.
2. Yoga and psychological well-being.
3. Mindfulness and physical activity.
4. Stress management.
5. Breathing practices and health.
6. Yoga for sports performance.
7. Exercise, lifestyle and wellness.
8. Holistic approaches to health promotion.

F. Contemporary Research Issues

Discussion and critical appraisal of emerging research in:

- physical literacy;
- exercise and mental health;
- women in sports;
- ageing and physical activity;
- childhood physical activity;
- exercise and cognitive function;
- sports technology;
- athlete monitoring;
- environmental sustainability in sports;
- sports analytics;
- artificial intelligence;
- genetic and individualized approaches to training;

- sports injury prevention;
- talent identification;
- inclusive sports;
- physical activity and public health.

EVALUATION PROCESS – UNIT III

The scholar shall be evaluated through a **subject-specific seminar/discussion and viva-voce** on a contemporary area of Physical Education or Sports Sciences.

Evaluation Criteria

Criterion	Marks
Relevance and depth of subject knowledge	4
Scientific evidence and contemporary literature	4
Critical analysis	4
Application/utility in Physical Education and Sports	4
Seminar/discussion and communication	2
Question-answer/viva-voce	2
Total	20

No seminar paper/project/research proposal is required to be submitted as a separate project.

OVERALL COURSE EVALUATION

Unit	Component	Credits	Marks
Unit I	Advanced Foundations of Physical Education and Sports Sciences	1	10
Unit II	Advanced Sports Science: Performance, Assessment and Interdisciplinary Approaches	1	20
Unit III	Contemporary and Emerging Areas in Physical Education and Sports Sciences	1	20
Total		3	50

MODE OF TEACHING AND LEARNING

The course shall be delivered through:

1. Advanced lectures.
2. Research-paper discussions.
3. Journal club activities.
4. Subject-specific case studies.
5. Critical appraisal of contemporary research.
6. Demonstration of assessment techniques.
7. Video-based sports performance analysis.
8. Statistical/data interpretation exercises.

9. Expert lectures.
10. Group discussion.
11. Seminar and academic presentation.
12. Question-answer and viva-voce.
13. Technology demonstrations.
14. Problem-based learning.

MODE OF EVALUATION

The evaluation shall emphasize **knowledge, understanding, critical thinking, application and scholarly discussion**, rather than project production.

Suggested Evaluation Pattern

Unit I – 10 Marks

Written/Oral Subject Assessment

Unit II – 20 Marks

Critical Evaluation and Subject-Specific Academic Assessment

Unit III – 20 Marks

Seminar + Discussion + Viva-Voce

No Project Requirement

The following shall **not** be compulsory requirements of C–3:

- Research project
- Research proposal
- Review article
- Dissertation
- Independent research paper
- Field project
- Experimental project

The emphasis shall be on **advanced subject knowledge and scholarly evaluation of existing scientific knowledge**.

SUGGESTED SUBJECT-SPECIFIC AREAS FOR SPECIALIZATION

Since Ph.D. scholars may come from different specializations, the department may organize teaching and academic discussions around the following areas:

1. **Exercise Physiology**
2. **Sports Training**
3. **Sports Biomechanics**
4. **Kinesiology**

5. **Sports Psychology**
6. **Sports Medicine**
7. **Sports Nutrition**
8. **Test, Measurement and Evaluation**
9. **Motor Learning**
10. **Motor Development**
11. **Physical Fitness and Wellness**
12. **Yoga Education**
13. **Adapted Physical Education**
14. **Physical Literacy**
15. **Sports Management**
16. **Sports Pedagogy**
17. **Sports Coaching**
18. **Talent Identification**
19. **Sports Performance Analysis**
20. **Strength and Conditioning**
21. **Technology and Artificial Intelligence in Sports**

RECOMMENDED ACADEMIC FRAMEWORK

The C–3 course should ultimately develop the following progression:

FOUNDATIONAL SUBJECT KNOWLEDGE

↓

ADVANCED SPORTS SCIENCE KNOWLEDGE

↓

INTERDISCIPLINARY UNDERSTANDING

↓

CRITICAL APPRAISAL OF SCIENTIFIC EVIDENCE

↓

CONTEMPORARY & EMERGING DEVELOPMENTS

↓

APPLICATION TO PHYSICAL EDUCATION AND SPORTS

↓

SCHOLARLY DISCUSSION & VIVA-VOCE

Final Course Outcome

The successful Ph.D. scholar should be able to **understand advanced subject matter, critically examine contemporary scientific evidence, integrate knowledge from different branches of Physical Education and Sports Sciences, evaluate its practical significance, and communicate subject-specific knowledge at doctoral level.**

This makes C–3 genuinely “**Subject Specific**”, while keeping it clearly distinct from C–1 (**Research Methodology**) and C–2 (**Research Appraisal/Research Evaluation**) and, importantly, **without converting the course into a project-submission requirement.**

10. INDIAN REFERENCES

1. **Kansal, D. K.**

Kansal, D. K. (2008). *Test and measurement in sports and physical education*. Sports & Spiritual Science Publications.

Publisher: Sports & Spiritual Science Publications

Address: New Delhi, India.

2. Verma, J. P.

Verma, J. P. (2016). *A textbook on sports statistics*. Sports Publication.

Publisher: Sports Publication

Address: 4262/3, Ansari Road, Daryaganj, New Delhi 110002, India.

3. Singh, A., Bains, J., Gill, J. S., & Brar, R. S.

Singh, A., Bains, J., Gill, J. S., & Brar, R. S. (2010). *Modern text book of physical education, health and sports*. Kalyani Publishers.

Publisher: Kalyani Publishers

Address: 4863/2B, Ansari Road, Daryaganj, New Delhi 110002, India.

4. Uppal, A. K., & Gautam, G. P.

Uppal, A. K., & Gautam, G. P. (2008). *Physical education and health*. Friends Publications.

Publisher: Friends Publications

Address: 1520, Ansari Road, Daryaganj, New Delhi 110002, India.

5. Kumar, S.

Kumar, S. (2011). *Anatomy, physiology, kinesiology and health education*. Sports Publication.

Publisher: Sports Publication

Address: 4262/3, Ansari Road, Daryaganj, New Delhi 110002, India.

6. Sharma, R. D.

Sharma, R. D. (2005). *Sports psychology*. Friends Publications.

Publisher: Friends Publications

Address: 1520, Ansari Road, Daryaganj, New Delhi 110002, India.

11. INTERNATIONAL REFERENCES

Anatomy and Exercise Physiology

7. Kenney, W. L., Wilmore, J. H., & Costill, D. L.

Kenney, W. L., Wilmore, J. H., & Costill, D. L. (2022). *Physiology of sport and exercise* (8th ed.). Human Kinetics.

Publisher: Human Kinetics

Address: 1607 N. Market Street, Champaign, IL 61825, USA.

8. McArdle, W. D., Katch, F. I., & Katch, V. L.

McArdle, W. D., Katch, F. I., & Katch, V. L. (2022). *Exercise physiology: Nutrition, energy, and human performance* (9th ed.). Wolters Kluwer.

Publisher: Wolters Kluwer

Address: 2501 West Chester Pike, New York, NY 10591, USA.

9. Moore, K. L., Dalley, A. F., & Agur, A. M. R.

Moore, K. L., Dalley, A. F., & Agur, A. M. R. (2018). *Clinically oriented anatomy* (8th ed.). Wolters Kluwer.

Publisher: Wolters Kluwer

Address: 2501 West Chester Pike, New York, NY 10591, USA.

Kinesiology and Biomechanics

10. Neumann, D. A.

Neumann, D. A. (2017). *Kinesiology of the musculoskeletal system: Foundations for rehabilitation* (3rd ed.). Elsevier.

Publisher: Elsevier

Address: 230 Park Avenue, New York, NY 10169, USA.

11. McGinnis, P. M.

McGinnis, P. M. (2020). *Biomechanics of sport and exercise* (4th ed.). Human Kinetics.

Publisher: Human Kinetics

Address: 1607 N. Market Street, Champaign, IL 61825, USA.

12. Hall, S. J.

Hall, S. J. (2022). *Basic biomechanics* (9th ed.). McGraw Hill.

Publisher: McGraw Hill

Address: 1325 Avenue of the Americas, New York, NY 10019, USA.

Sports Training

13. Bompa, T. O., & Buzzichelli, C.

Bompa, T. O., & Buzzichelli, C. (2019). *Periodization: Theory and methodology of training* (6th ed.). Human Kinetics.

Publisher: Human Kinetics

Address: 1607 N. Market Street, Champaign, IL 61825, USA.

14. Haff, G. G., & Triplett, N. T.

Haff, G. G., & Triplett, N. T. (Eds.). (2016). *Essentials of strength training and conditioning* (4th ed.). Human Kinetics.

Publisher: Human Kinetics

Address: 1607 N. Market Street, Champaign, IL 61825, USA.

Sports Psychology

15. Weinberg, R. S., & Gould, D.

Weinberg, R. S., & Gould, D. (2019). *Foundations of sport and exercise psychology* (7th ed.). Human Kinetics.

Publisher: Human Kinetics

Address: 1607 N. Market Street, Champaign, IL 61825, USA.

16. Williams, J. M., & Krane, V. (Eds.)

Williams, J. M., & Krane, V. (Eds.). (2021). *Applied sport psychology: Personal growth to peak performance* (8th ed.). McGraw Hill.

Publisher: McGraw Hill

Address: 1325 Avenue of the Americas, New York, NY 10019, USA.

Sports Medicine

17. Brukner, P., & Khan, K.

Brukner, P., & Khan, K. (2017). *Clinical sports medicine* (5th ed.). McGraw-Hill Education.

Publisher: McGraw-Hill Education

Address: 2 Penn Plaza, New York, NY 10121, USA.

18. Bahr, R., & Engebretsen, L. (Eds.)

Bahr, R., & Engebretsen, L. (Eds.). (2009). *Sports injury prevention*. Wiley-Blackwell.

Publisher: Wiley-Blackwell

Address: 9600 Garsington Road, Oxford OX4 2DQ, United Kingdom.

Test, Measurement and Evaluation

19. Miller, D. K.

Miller, D. K. (2018). *Measurement by the physical educator: Why and how* (8th ed.). McGraw-Hill Education.

Publisher: McGraw-Hill Education

Address: 2 Penn Plaza, New York, NY 10121, USA.

20. Baumgartner, T. A., Jackson, A. S., Mahar, M. T., & Rowe, D. A.

Baumgartner, T. A., Jackson, A. S., Mahar, M. T., & Rowe, D. A. (2016). *Measurement for evaluation in physical education and exercise science* (9th ed.). McGraw-Hill Education.

Publisher: McGraw-Hill Education

Address: 2 Penn Plaza, New York, NY 10121, USA.

12. IMPORTANT NOTE ON APA 7 AND PUBLISHER ADDRESSES

Because you specifically requested **publisher addresses**, they have been listed separately under each reference.

However, in **APA 7th edition**, the standard reference for a book **does not normally include the publisher's city or postal address**. The academically correct APA 7 reference is therefore:

Bompa, T. O., & Buzzichelli, C. (2019). *Periodization: Theory and methodology of training* (6th ed.). Human Kinetics.

The publisher address can be retained in the **university syllabus's separate reference-information column**, if required by the institution.

13. RECOMMENDED CORE REFERENCES

For the official syllabus, I suggest identifying the following as the **principal/core texts**:

1. **Kenney, Wilmore & Costill** – *Physiology of Sport and Exercise*
2. **McArdle, Katch & Katch** – *Exercise Physiology*
3. **Neumann** – *Kinesiology of the Musculoskeletal System*
4. **McGinnis** – *Biomechanics of Sport and Exercise*
5. **Bompa & Buzzichelli** – *Periodization*
6. **Weinberg & Gould** – *Foundations of Sport and Exercise Psychology*
7. **Brunker & Khan** – *Clinical Sports Medicine*
8. **Miller** – *Measurement by the Physical Educator*
9. **Baumgartner et al.** – *Measurement for Evaluation in Physical Education and Exercise Science*

PRE-Ph.D. COURSE WORK**COURSE-IV (C-4): RESEARCH AND PUBLICATION ETHICS IN PHYSICAL EDUCATION AND SPORTS SCIENCES****Course Structure**

Particular	Details
Course Code	C-4
Course Title	Research and Publication Ethics in Physical Education and Sports Sciences
Nature of Course	Core / Compulsory
Credits	2 Credits
Maximum Marks	20 Marks
Units	2 Units
Marks per Unit	10 Marks
Suggested Teaching Hours	30 Hours
Project Submission	Not Required

1. COURSE RATIONALE

Research and publication ethics constitute an essential component of doctoral education. The credibility of Physical Education and Sports Sciences depends upon the integrity of the research process, ethical treatment of participants, accurate reporting of findings, responsible authorship, appropriate citation, transparent data management and publication in credible scholarly journals.

Research in Physical Education and Sports Sciences frequently involves **human participants, athletes, children, persons with disabilities, physiological testing, psychological assessment, exercise interventions, nutritional interventions, personal data, video recordings and performance data**. Consequently, doctoral researchers must understand both general research ethics and discipline-specific ethical responsibilities.

This course is designed to develop ethical awareness and responsible research practices among Ph.D. scholars. It emphasizes **understanding, identification, critical evaluation and application of ethical principles**, rather than preparation or submission of any project.

2. COURSE OBJECTIVES

The course aims to enable scholars to:

1. Understand the fundamental principles of research ethics.
2. Understand ethical responsibilities associated with doctoral research.
3. Identify research misconduct and questionable research practices.
4. Understand plagiarism and methods of maintaining academic integrity.

5. Understand ethical requirements relating to human participants in Physical Education and Sports research.
6. Understand informed consent, confidentiality and protection of participant data.
7. Understand responsible authorship and publication practices.
8. Identify unethical and predatory publishing practices.
9. Understand peer-review ethics and responsibilities of reviewers.
10. Understand conflicts of interest in research and publication.
11. Develop responsible practices for data collection, storage, analysis and reporting.
12. Understand ethical use of digital technologies, artificial intelligence and sports data.
13. Apply ethical principles to practical situations arising in Physical Education and Sports Sciences.

3. COURSE LEARNING OUTCOMES

After successful completion of the course, the scholar will be able to:

CLO1: Explain fundamental concepts and principles of research ethics.

CLO2: Distinguish responsible research practices from research misconduct.

CLO3: Identify different forms of plagiarism, fabrication, falsification and unethical publication practices.

CLO4: Explain ethical requirements for research involving human participants in Physical Education and Sports Sciences.

CLO5: Evaluate issues relating to informed consent, privacy, confidentiality and data protection.

CLO6: Explain responsible authorship, citation, acknowledgement and publication practices.

CLO7: Identify credible journals and recognize predatory publishing practices.

CLO8: Demonstrate understanding of ethical peer review and conflict-of-interest management.

CLO9: Evaluate ethical issues associated with AI, digital technologies and sports-performance data.

CLO10: Apply ethical principles to research and publication-related situations.

UNIT-I

FUNDAMENTALS OF RESEARCH ETHICS AND RESPONSIBLE CONDUCT OF RESEARCH

1 Credit – 10 Marks

A. Introduction to Research Ethics

1. Meaning and definition of research ethics.
2. Nature and importance of research ethics.
3. Principles of ethical research.
4. Integrity, honesty, transparency and accountability.
5. Responsible conduct of research.
6. Ethical responsibilities of a researcher.
7. Ethical responsibilities of research supervisors.
8. Ethical responsibilities of research institutions.
9. Ethical responsibilities towards research participants.

B. Ethical Principles in Physical Education and Sports Research

1. Respect for human dignity.
2. Autonomy.
3. Beneficence.
4. Non-maleficence.
5. Justice and fairness.
6. Voluntary participation.
7. Privacy and confidentiality.
8. Risk-benefit assessment.
9. Protection of vulnerable participants.
10. Special considerations in research involving athletes.

C. Research Involving Human Participants

Particular emphasis shall be given to research commonly undertaken in Physical Education and Sports Sciences.

Ethical issues relating to:

- exercise testing;
- fitness testing;
- physiological assessment;
- biomechanical analysis;
- psychological testing;
- sports-performance testing;
- exercise interventions;
- training interventions;
- nutritional interventions;
- injury-related research;
- research involving children;
- research involving older adults;
- research involving persons with disabilities;
- research involving athletes.

D. Informed Consent

1. Meaning and importance.
2. Essential elements of informed consent.
3. Voluntary participation.

4. Right to withdraw.
5. Risks and benefits.
6. Information to be provided to participants.
7. Consent of parents/guardians for minors.
8. Assent of children.
9. Consent in sports teams and institutional settings.
10. Consent for photographs, video and performance recordings.

E. Research Ethics Committee / Institutional Ethics Committee

1. Purpose and functions.
2. Ethical review of research proposals.
3. Risk assessment.
4. Participant protection.
5. Confidentiality.
6. Monitoring of research.
7. Ethical approval and its significance.
8. Amendments to approved research.
9. Reporting adverse events where applicable.
10. Researcher's responsibilities following ethical approval.

F. Research Data Ethics

1. Data ownership.
2. Data collection and documentation.
3. Data accuracy.
4. Data storage and security.
5. Confidentiality.
6. Anonymization and de-identification.
7. Protection of personal information.
8. Secure handling of physiological and psychological data.
9. Management of video and photographic data.
10. Responsible sharing of research data.

G. Research Misconduct

Major forms

1. **Fabrication** – making up data or results.
2. **Falsification** – manipulating research materials, processes or data.
3. **Plagiarism** – presenting another person's work or ideas without appropriate acknowledgement.
4. Misrepresentation of research findings.
5. Manipulation of images or figures.
6. Suppression of relevant findings.
7. Selective reporting.
8. Duplicate or redundant research.
9. Misuse or unauthorized alteration of data.

Questionable Research Practices

- selective citation;
- inappropriate exclusion of data;
- p-hacking;
- HARKing;
- salami publication;
- inappropriate manipulation of statistical results;
- Misleading presentation of findings.

H. Ethical Issues in Data Analysis and Reporting

1. Accurate recording of data.
2. Appropriate statistical analysis.
3. Avoidance of manipulation.
4. Honest reporting of results.
5. Reporting negative and non-significant findings.
6. Reporting limitations.
7. Distinguishing correlation from causation.
8. Avoidance of exaggerated conclusions.
9. Appropriate graphical representation.
10. Reproducibility and transparency.

UNIT-I EVALUATION

Maximum: 10 Marks

Evaluation Component	Marks
Written assessment on research ethics	3
Case-study based ethical analysis	3
Critical discussion/academic participation	2
Short-answer/oral assessment	2
Total	10

The case studies shall preferably be drawn from **Physical Education and Sports Sciences**, such as ethical issues in exercise intervention, testing of athletes, research involving children, use of sports-performance data and physiological testing.

UNIT-II

PUBLICATION ETHICS, ACADEMIC INTEGRITY AND EMERGING ETHICAL ISSUES

1 Credit – 10 Marks

A. Publication Ethics

1. Meaning and importance of publication ethics.
2. Principles of responsible publication.
3. Ethical responsibilities of authors.

4. Ethical responsibilities of editors.
5. Ethical responsibilities of reviewers.
6. Transparency in publication.
7. Reporting standards.
8. Correction and retraction of publications.
9. Expression of concern.
10. Responsible communication of research findings.

B. Authorship and Contributorship

1. Meaning of authorship.
2. Criteria for authorship.
3. Order of authorship.
4. Corresponding author.
5. Equal contribution.
6. Acknowledgement.
7. Gift authorship.
8. Guest authorship.
9. Ghost authorship.
10. Disputes regarding authorship.
11. Supervisor–scholar authorship issues.
12. Institutional affiliation and acknowledgement.

C. Plagiarism and Academic Integrity

1. Meaning of plagiarism.
2. Direct plagiarism.
3. Mosaic plagiarism.
4. Paraphrasing plagiarism.
5. Self-plagiarism.
6. Duplicate publication.
7. Text recycling.
8. Plagiarism in thesis/dissertation.
9. Plagiarism in research articles.
10. Proper paraphrasing.
11. Citation and referencing.
12. Maintaining academic integrity.

Plagiarism Detection

Introduction to:

- similarity checking;
- interpretation of similarity reports;
- limitations of similarity percentages;
- appropriate citation;
- responsible paraphrasing.

D. Publication Misconduct

1. Duplicate publication.
2. Simultaneous submission.
3. Salami slicing.
4. Manipulation of citations.
5. Fabricated references.
6. Fake peer review.
7. Manipulation of peer-review processes.
8. Misleading claims of publication.
9. Undisclosed conflicts of interest.
10. Misrepresentation of institutional affiliation.

E. Predatory Journals and Publishers

1. Meaning of predatory publishing.
2. Characteristics of predatory journals.
3. Unsolicited publication invitations.
4. False claims of indexing.
5. False impact factors.
6. Unrealistic publication promises.
7. Inadequate peer review.
8. Hidden publication charges.
9. Deceptive journal websites.
10. Misleading editorial boards.

Identification of Credible Journals

Scholars shall learn to examine:

- journal scope;
- editorial board;
- peer-review process;
- publisher;
- indexing claims;
- publication ethics policy;
- article-processing charges;
- archiving policy;
- journal website;
- retraction/correction policies.

F. Peer Review Ethics

1. Meaning and purpose of peer review.
2. Types of peer review.
3. Responsibilities of reviewers.
4. Confidentiality.
5. Objectivity.
6. Constructive criticism.
7. Conflict of interest.
8. Appropriate use of unpublished manuscripts.
9. Reviewer misconduct.

10. Ethical handling of confidential research information.

G. Conflict of Interest

1. Meaning of conflict of interest.
2. Financial conflict.
3. Personal conflict.
4. Professional conflict.
5. Institutional conflict.
6. Academic competition.
7. Disclosure requirements.
8. Management of conflicts of interest.

Examples relevant to Physical Education and Sports Sciences shall include:

- commercial sports equipment;
- nutritional products;
- fitness technology;
- sports testing equipment;
- sponsored research;
- coaching interventions;
- consultancy relationships.

H. Open Science and Responsible Research

1. Open access.
2. Open data.
3. Data sharing.
4. Preprints.
5. Research transparency.
6. Reproducibility.
7. Research protocols.
8. Registered reports.
9. Responsible use of repositories.
10. Benefits and risks of open research.

I. Artificial Intelligence and Publication Ethics

1. Use of AI in academic research.
2. AI-assisted literature searching.
3. AI-assisted language editing.
4. AI-generated text and academic integrity.
5. AI-generated references.
6. Fabricated or inaccurate citations.
7. Disclosure of AI assistance.
8. Researcher responsibility for AI-assisted content.
9. Privacy and confidentiality when using AI tools.
10. AI and authorship.
11. Ethical use of AI in sports analytics and athlete monitoring.

J. Discipline-Specific Publication Ethics in Physical Education and Sports Sciences

Special attention shall be given to:

1. Publication of athlete performance data.
2. Confidentiality of athlete information.
3. Publication of photographs and videos.
4. Research involving children and young athletes.
5. Publication of injury information.
6. Psychological assessment data.
7. Genetic and biological information.
8. Sports nutrition and supplement research.
9. Commercial sponsorship.
10. Conflicts involving coaches, athletes and researchers.
11. Responsible reporting of sports-performance findings.
12. Ethical communication of research findings to athletes and the public.

K. Researcher's Social and Professional Responsibility

1. Responsible dissemination of research.
2. Media communication.
3. Avoidance of sensationalism.
4. Scientific communication to athletes, coaches and teachers.
5. Distinguishing evidence from opinion.
6. Public responsibility of researchers.
7. Responsible use of social media for academic communication.

UNIT-II EVALUATION

Maximum: 10 Marks

Evaluation Component	Marks
Written assessment on publication ethics and academic integrity	3
Case-study analysis on publication/academic misconduct	3
Journal/publisher credibility evaluation exercise	2
Viva-voce/oral assessment	2
Total	10

Again, these are **evaluation/learning activities and not project submissions**.

4. OVERALL COURSE EVALUATION

Unit	Area	Credit	Marks
Unit-I	Fundamentals of Research Ethics and Responsible Conduct of Research	1	10
Unit-II	Publication Ethics, Academic Integrity and Emerging Ethical Issues	1	10

Unit	Area	Credit	Marks
Total		2 Credits	20 Marks

5. SUGGESTED TEACHING–LEARNING METHODS

The course should be delivered through:

- interactive lectures;
- case studies;
- ethical dilemma discussions;
- research-paper analysis;
- publication ethics examples;
- plagiarism/similarity-report interpretation;
- journal credibility assessment;
- mock peer-review exercises;
- group discussions;
- analysis of research misconduct cases;
- seminar discussions;
- expert lectures;
- viva-voce.

The emphasis should be on **problem-solving and ethical decision-making**, rather than memorization.

6. SUGGESTED CASE-STUDY AREAS

To make the C–4 course genuinely relevant to Physical Education and Sports Sciences, case studies may include:

Case 1 – Fabrication

A researcher creates fitness-test scores for participants who were absent from testing.

Case 2 – Falsification

An investigator removes inconvenient observations from an exercise intervention without methodological justification.

Case 3 – Plagiarism

A scholar reproduces paragraphs from a published article without citation.

Case 4 – Self-Plagiarism

A researcher republishes substantial portions of an earlier paper in a new article without disclosure.

Case 5 – Authorship

A supervisor is included as an author despite having made no qualifying contribution.

Case 6 – Human Participants

A researcher conducts an exercise intervention without appropriate informed consent.

Case 7 – Children

A researcher collects fitness data from schoolchildren without appropriate parental/guardian consent and child assent.

Case 8 – Athlete Confidentiality

An athlete's injury and psychological assessment information is published in an identifiable form.

Case 9 – Predatory Journal

A journal falsely claims indexing in recognized databases and requests immediate publication fees.

Case 10 – Conflict of Interest

A researcher evaluates a commercial sports supplement while receiving financial support from its manufacturer.

Case 11 – AI

A scholar submits AI-generated references that do not actually exist.

Case 12 – Peer Review

A reviewer uses confidential information from an unpublished manuscript in their own research.

7. IMPORTANT NOTE ON PROJECT SUBMISSION

C-4 is an ethics and academic-integrity course and shall not require any independent project submission.

The following shall **not** be mandatory:

- Research project
- Research proposal
- Review article
- Dissertation
- Thesis
- Publication
- Ethics project
- Independent research report

The scholar shall instead be assessed through:

Understand → Identify → Analyze → Apply → Evaluate

ethical principles and situations relevant to doctoral research.

8. RECOMMENDED REFERENCE AREAS

The course should be supported by authoritative materials concerning:

1. Research ethics and responsible conduct of research.
2. Institutional ethics committee guidelines.
3. National and international ethical principles for human-participant research.
4. Publication ethics.
5. Plagiarism and academic integrity.
6. Authorship and contributorship.
7. Peer-review ethics.
8. Journal selection and predatory publishing.
9. Research data management.
10. Responsible use of Artificial Intelligence in research.

Relevant institutional and professional guidelines may be updated periodically so that the curriculum remains consistent with **current UGC, university, ethical-committee and recognized publication-ethics requirements.**

9. COURSE STRUCTURE AT A GLANCE

UNIT-I

RESEARCH ETHICS

Research Integrity

↓

Human Participants

↓

Informed Consent

↓

Ethical Approval

↓

Data Ethics

↓

Research Misconduct

↓

Responsible Research

1 Credit | 15 Marks

UNIT-II

PUBLICATION ETHICS

Academic Integrity



Plagiarism



Authorship



Peer Review



Conflict of Interest



Predatory Publishing



Open Science



AI Ethics

1 Credit | 10 Marks

OVERALL C-4 OUTCOME

**ETHICAL AWARENESS → RESPONSIBLE RESEARCH → ACADEMIC
INTEGRITY → RESPONSIBLE PUBLICATION → PROFESSIONAL RESEARCH
CONDUCT**

11. INDIAN REFERENCES

1. University Grants Commission

University Grants Commission. (2018). *University Grants Commission (Promotion of Academic Integrity and Prevention of Plagiarism in Higher Educational Institutions) Regulations, 2018*. University Grants Commission.

Publisher: University Grants Commission

Address: Bahadur Shah Zafar Marg, New Delhi 110002, India.

2. University Grants Commission

University Grants Commission. (2022). *Academic and research integrity*. University Grants Commission.

Publisher: University Grants Commission

Address: Bahadur Shah Zafar Marg, New Delhi 110002, India.

The UGC publication specifically discusses fabrication, falsification, plagiarism and the broader problem of compromised academic integrity and predatory publishing.

3. Kothari, C. R., &Garg, G.

Kothari, C. R., &Garg, G. (2019). *Research methodology: Methods and techniques* (4th ed.). New Age International Publishers.

Publisher: New Age International Publishers
Address: 7/30-A, Daryaganj, New Delhi 110002, India.

4. Kumar, R.

Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners* (5th ed.). SAGE Publications India.

Publisher: SAGE Publications India Pvt. Ltd.
Address: B1/I-1, Mohan Cooperative Industrial Area, Mathura Road, New Delhi 110044, India.

5. Indian Council of Medical Research

Indian Council of Medical Research. (2017). *National ethical guidelines for biomedical and health research involving human participants*. Indian Council of Medical Research.

Publisher: Indian Council of Medical Research
Address: V. Ramalingaswami Bhawan, Ansari Nagar, New Delhi 110029, India.

This is particularly relevant to Physical Education and Sports Sciences where research may involve exercise interventions, physiological testing and human participants.

12. INTERNATIONAL REFERENCES

6. American Psychological Association

American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). American Psychological Association.

Publisher: American Psychological Association
Address: 750 First Street NE, Washington, DC 20002, USA.

7. World Medical Association

World Medical Association. (2013). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA*, 310(20), 2191–2194.

Publisher: American Medical Association
Address: 330 North Wabash Avenue, Chicago, IL 60611, USA.

8. Shamoo, A. E., & Resnik, D. B.

Shamoo, A. E., & Resnik, D. B. (2015). *Responsible conduct of research* (3rd ed.). Oxford University Press.

Publisher: Oxford University Press
Address: 198 Madison Avenue, New York, NY 10016, USA.

9. Resnik, D. B.

Resnik, D. B. (2020). *The ethics of science: An introduction*. Routledge.

Publisher: Routledge

Address: 711 Third Avenue, New York, NY 10017, USA.

10. Committee on Publication Ethics

Committee on Publication Ethics. (2019). *COPE core practices*. Committee on Publication Ethics.

Publisher: Committee on Publication Ethics

Address: 22 Nassau Street, London, SE1 7AZ, United Kingdom.

COPE's core practices cover areas including allegations of misconduct, authorship and contributorship, complaints and appeals, competing interests, data and reproducibility, and ethical oversight.

11. National Academies of Sciences, Engineering, and Medicine

National Academies of Sciences, Engineering, and Medicine. (2017). *Fostering integrity in research*. The National Academies Press.

Publisher: The National Academies Press

Address: 500 Fifth Street NW, Washington, DC 20001, USA.

12. Steneck, N. H.

Steneck, N. H. (2006). *Introduction to the responsible conduct of research*. Office of Research Integrity, U.S. Department of Health and Human Services.

Publisher: Office of Research Integrity, U.S. Department of Health and Human Services

Address: 1101 Wootton Parkway, Suite 750, Rockville, MD 20852, USA.

13. UNESCO

UNESCO. (2017). *Recommendation on science and scientific researchers*. UNESCO.

Publisher: UNESCO

Address: 7, place de Fontenoy, 75007 Paris, France.

UNESCO's recommendation emphasizes integrity, ethical principles, equitable access to scientific knowledge, preservation of research outputs and appropriate peer review.