Department of Computer Science and Applications
Chaudhary Ranbir Singh University, Jind

Proposed Scheme and Syllabus of PhD Course Work w.e.f. Academic Session 2020-21

Scheme and Course Structure for PhD Course Work

Paper Code	Nomenclature	Credit	L:T:P	Max Marks (External)	Min Pass Marks (External)	Max Marks (Internal)	Min Pass Marks (Internal)	Max Marks (Total)	Min Pass Marks (Total)
20-PHD-1	Research Methods in Computer Science	4	3:0:2	80	40	20	10	100	55
20-PHD-2	Data Analytics	4	3:0:2	80	40	20	10	100	55
20-PHD-3(i)	Research and Publication Ethics	2	1:0:2	48	24	12	06	60	33
20-PHD-3(ii)	Review of Literature and Seminar	2	2:0:0	40	22	0	0	40	22

20-PHD-1 RESEARCH METHODS IN COMPUTER SCIENCE

Time 3 Hours Max Marks 100 (External 80, Internal 20)
Credit 4

Examiner's Note: The examiner will set two questions from each unit. Candidate need to attempt five questions in all selecting at least one question from each section.

Course Objective:

1. To learn elements of style for thesis and research paper writing
2. Developing a hypothesis, a research problem and related questions
3. Framing the problem with the correct research methodology
4. Collecting data that accurately addresses the research problem
5. Measuring the effectiveness of a program
6. Accurately collect, analyze and report data
7. Present complex data or situations clearly
8. Review and analyze research findings
9. Using data to make decisions

Unit – I

Elements of Style: Form the possessive singular of nouns with 's, In a series of three or more terms with a single conjunction, use a comma after each term except the last, Enclose parenthetic expressions between commas, Place a comma before and / or but introducing an independent clause, Do not join independent clauses by a comma, Do not break sentences in two, A participial phrase at the beginning of a sentence must refer to the grammatical subject, Divide words at line-ends, in accordance with their formation and pronunciation,

Divide the word according to its formation: Divide "on the vowel:", Divide between double letters, unless they come at the end of the simple form of the word,

Elementary Principles of Composition: Make the paragraph the unit of composition: one paragraph to each topic, begin each paragraph with a topic sentence, Use the active voice. The active voice is usually more direct and vigorous than the passive, Put statements in positive form, Omit needless words, Avoid a succession of loose sentences, . Express co-ordinate ideas in similar form, Keep related words together, keep to one tense in summaries, Place the emphatic words of a sentence at the end

Unit – II

Introduction to The Process of Conducting Research, Steps in the Process of Research, Identifying a hypothesis and/or research problem, specifying a purpose, creating research questions, Reviewing literature, Draft a Research Proposal, Ethics of research and informed consent

Introduction to Qualitative Research, Essence of Qualitative Data, Sampling, Collection Techniques, Biography, Phenomenology, Grounded Theory, Ethnography, Case Study

Interpreting Qualitative Data, Qualitative Data Analysis Procedures, Coding, Thematic development

Introduction to Quantitative Research, Essence of Quantitative Data, Collection and Analysis Techniques

Unit – III

Sampling Concepts, Defining the Target Population, Representative Sample, Potential Consequences of Unrepresentative Sampling (Gaming the System), Over Representative Subgroups/ Weighting Design Effect, Sampling Methods (Cluster, Stratified, Simple, Random)

Quantitative Data Collection Instruments, Choosing a good instrument, Interval and Ratio Scales

Introduction to Applied Statistics, Identifying the dependent and independent variables, Confidence levels, Math that manipulates data

Descriptive Statistics, Summarizing and describing a collection of data, univariate and bivariate analysis, Mean, mode and standard deviation, Percentages and Ratios, Histograms, Identifying randomness and uncertainty in data.

Unit IV

Inferential Statistics, Drawing inference from data, Modeling assumptions, Identifying Patterns, Regression analysis, T-test, Analysis of Variance, Correlations, Chi-square

Introduction to Mixed Methods Research, Advantages, Design Components, Explanatory Mixed Methods Framework, Exploratory Mixed Methods Framework

Writing about Quantitative Findings, Draft Final Research Paper for Peer Review, Writing About Qualitative or Mixed Methods Findings, Critically Critiquing Research Reports, Reflection Paper on Peer Review Process, Writing final thesis.

Suggested Readings:

1. John Creswell, *Research Design : Qualitative, Quantitative and Mixed Method Approaches,* SAGE Publications, Fourth Edition, 2013
2. George W. Snecdecor and William G. Cochran, *Statistical Methods*, Wiley-Blackwell; 8th edition, 1989
3. Strunk W., Jr. and White, E.B. *The Elements of Style*, Allyn and Bacon, 1999

20-PHD-2 Data Analytics

Time 3 Hours Max Marks 100 (External 80, Internal 20)
Credit 4

Examiner's Note: The examiner will set two questions from each unit. Candidate need to attempt five questions in all selecting at least one question from each section.

Course Objective:

1. To understand Big Data Platform and its usage.
2. To provide an overview of Apache Hadoop.
3. To provide HDFS concepts and interfacing with HDFS.
4. To understand MapReduce jobs.
5. To understand how to report analysis and results.

Unit – I

Introduction to Big Data, Nature of Big Data, Risks of Big Data, Structure of Big Data, Exploring Big Data, Filtering Big Data, Mixing Big Data with traditional data

Web Data, Importance of Web Data, Web Data in Action

Unit – II

Value of Telematics Data, Value of Text Data, Value of Time and Location Data, Value of Radio Frequency Identification Data, Value of Smart Grid Data, Value of Casino Chip Tracking Data, Value of Sensor Data, Value of Telemetry Data, Value of Social Network Data

Introduction to Scalability, Convergence of Analytics and Data Environments, Massively Parallel Processing Systems, Cloud Computing, Grid Computing, Map Reduce

Unit – III

The Analytic Sandbox, Analytic Data Set, Enterprise Analytic Dataset, Embedded Scoring

Evolution of Analytical Methods, Evolution of Analytical Tools

Unit – IV

Analysis vs Reporting, Core Analytics vs Advanced Analytics, Framing the Problem Correctly, Statistical Significance vs Business Importance, Sample vs Population, Making Inferences vs Computing Statistics

Suggested Readings:

1. Franks Bill, *Taming The Big Data Tidal Wave*, John Wiley & Sons, 2012
2. Glenn J. Myatt, *Making Sense of Data: A Practical Guide to Exploratory Data Analysis and Data Mining,* Wiley – Blackwell, 2006
3. Franks Bill, *97 Things About Ethics Everyone in Data Science Should Know,* O'Reilly, 2020

20-PHD- 3 (a) Research and Publication Ethics

Time 3 Hours | Max Marks 60 (External 48, Internal 12)
Credit 2

Examiner's Note: The examiner will set two questions from each unit. Candidate need to attempt five questions in all selecting at least one question from each section.

Course Objective:

1. To understand Philosophy and Ethics
2. To learn Scientific Conduct
3. To know about Publication Ethics
4. To know about Open Access Publishing
5. To understand Publication Misconduct
6. To learn Databases and Research Metrics

Unit – I

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

Ethics with respect to science and research, Intellectual honest and research integrity, Scientific misconducts: falsification, fabrication, and plagiarism.

Redundant publications: duplicate and overlapping publications, salami slicing
Selective reporting and misrepresentation of data.

Unit II

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

Unit III

Open access publications and initiatives, SHERPA/RoMEO Online resources to check publisher copyright and self-archiving policies, Software tool to identify predatory publications, Journal finder/ journal suggester tools

Unit IV

Ethical Issues related to Computer Science, FFP, authorship, conflict interest, complaints and appeals : examples and fraud from India an abroad.

Use of plagiarism detection software like Turnitin, Urkund and other open source software tools.

Indexing databases, Citation databases: Web of Science, Scopus, Thompson Reuter etc.

Impact Factor of journal as per journal citation report, SNIP, SJR, IPP, Cite Score.

Metrics: h-index, g index, i10 index, altmetrics.

Suggested Readings:

1. Muralidhar K et. al., *Ethics in Science Education, Research and Governance,* Indian National Science Academy, 2019
2. Huma Praveen and Nayeem Showkat, *Research Ethics,* e-PG Pathshala, 2017
3. Bird A, Philosophy of Science, Routledge, 2006
4. MacIntye, Alasdair, A Short History of Ethics, London, 1967
5. P. Chaddah, Ethics in Competitive Research : Do not get scooped; do not get plagiarized, ISBN: 978-9387480865 (Self Published)

20-PHD- 3 (b) Literature Review and Seminar

Max Marks 40
Credit 2

Examiner's Note : Examiner will evaluate the Literature reviewed by the candidate through Seminar.

Course Objective:

1. To know about the methodology to review the literature
2. To find out the domain for latest research in Computer Science.
3. To study the research gap
4. To understand problem definition for research to be conducted.
5. To find out objectives for research work.

The supervisor assigned to Candidate will supervise the candidate to complete above said objectives.