

THE UNIVERSITY OF BURDWAN
DEPARTMENT OF COMPUTER SCIENCE
SYLLABUS FOR Ph. D. COURSE WORK (COMPUTER SCIENCE)
(EFFECTIVE FROM ACADEMIC SESSION: 2020 – 2021)

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- 1) Duration** : Six Months (One Semester)
2) Total Marks : 175 (50 + 25 + 50 + 50)
3) Total Credit Points : 14 (4 + 2 + 4 + 4)

Semester-I	(L-T-P) Credits	Marks
Courses		
PHSCS -101: Research Methodology	(3-1-0) 4	50
PHSCS-102: UGE Research and Publication Ethics (RPE)	(2-0-0) 2	25
PHSCS-103: Compulsory / Optional Paper	(3-1-0) 4	50
PHSCS-104: Term Paper (S) & Related Seminar Presentation	(4-0-0) 4	50(25+25)
Total	14	175

- a) **Research Methodology: An Introduction**
Objective, Motivation, Types of Research, Research Methods versus Methodology, Research Process, Criteria of Good Research.
- b) **Defining the Research Problems**
Definition, Selecting Research Problems, Defining Problems.
- c) **Research Design**
Features of Good Research, Concepts of Research Design, Different Research Design, Experimental design.
- d) **Methods of Data Collection**
Collection of Primary Data, Observation Method, Data Collection through Questionnaires, Data Collection through Questionnaires Schedules, Other Methods of Data Collection, Collection of Secondary Data.
- e) **Processing and Analysis of Data**
Processing Operation, Problem Processing, Types of Analysis, Statics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry, Measures of Relationship, Partial Correlation.
- f) **Sampling Fundamentals**
Need for Sampling, Sampling Distribution, Sampling Theory, Standard Error, Estimation, Population Mean, Population Proportion, Sample Size Determination, Precision Rate and Confidence Level, Bayesian Statics.
- g) **Interpretation and Report Writing**
Meaning of Interpretation, Techniques of Interpretation, Precaution in Interpretation, Significance of Report Writing, Steps in Writing Report, Types of Report, Oral Presentation.
- h) **The Computer: In Research Work**
Computer Technology, Characteristics, Number Systems, Binary Arithmetic, Programming Techniques.

PHSCS-102: UGE Research And Publication Ethics (RPE)**25 Marks****Course Title**

- **Research and publication Ethics (RPE):** Course for awareness about the publication ethics and misconducts

Course Level

- 2 Credits (30 hours)

Eligibility

- M Phil, Ph.D. students and interested faculty members (it will be made available to post graduate students at later date)

Fees

- As per university rules

Faculty

- Interdisciplinary studies

Qualification of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years of teaching experience

About the course**Course Code: CPE-RPE****Overview**

- This course has total 6 units focusing on basics of philosophy of Science and ethics, research integrity, Publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact factor, etc.) and plagiarism tools will be introduced in this course.

Pedagogy

- Class room teaching, guest lectures, group discussions and practical sessions.

Evaluation

- Continuous assessment will be done through tutorials, assignments, quizzes and group discussions. Weightage will be given for active Participation. Final written examination will be conducted at the end of the course.

Course structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching hours
Theory		
RPE 01	Philosophy of Ethics	4
RPE 02	Scientific Conduct	4
RPE 03	Publications Ethics	7
Practice		
RPE 04	Open Access Publishing	4
RPE 05	Publication Misconduct	4
RPE 06	Databases and Research Metrics	7
Total		30

Syllabus in details

THEORY

- **RPE 01: PHILOSOPHY OF ETHICS (3 hr)**
 1. Introduction of philosophy: Definition, Nature and scope, concept, branches
 2. Ethics: Definition, moral philosophy, nature of moral judgements and reactions

- **RPE 02: SCIENTIFIC CONDUCT (5 hr)**
 1. Ethics with respect to science and research
 2. Intellectual honesty and research integrity
 3. Scientific misconducts: Falsification and Fabrication, and Plagiarism (FFP)
 4. Redundant publications: Duplicate and overlapping publications, Salami Slicing
 5. Selective reporting and misrepresentation of data

- **RPE 03: PUBLICATION ETHICS (7 hr)**
 1. Publication ethics: Definition, introduction and importance
 2. Best practices/standards setting initiatives and guidelines: COPE, WAME, etc.
 3. Conflicts of interest
 4. Publication misconduct: Definition, concept, problems that lead to unethical behavior and vice-versa, types
 5. Violation of publication ethics, authorship and contributorship
 6. Identification of publication misconduct, complaints and appeals
 7. Predatory publishers and journals

PRACTICE

- **RPE 04; OPEN ACCESS PUBLISHING (4 hr)**
 1. Open access publications and initiatives
 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
 3. Software tool to identify predatory publications developed by SPPU
 4. Journal finder/journal suggestion tool viz., ZAME, Elsevier journal Finder, Springer journal suggester, etc.

- **RPE 05: PUBLICATION MISCONDUCT (4 hr)**
 - A. Group discussion (2 hr)**
 1. Subject specific ethical issues, FFP, authorship
 2. Conflicts of interest
 3. Complaints and appeals: Examples and fraud from India and abroad
 - B. Software tools (2 hr)**
 - Use of plagiarism software like Turnitin, Urkund and other open source software tools

RPE 06: DATABASES AND RESEARCH METRICS

- A. Databases (4 hr)**
 1. Indexing databases
 2. Citation databases: Web of science, Scopus, etc.

B. research Metrics (3 hr)

1. Impact Factor of journal as per journal Citation report, SNIP, SJR, IPP, Cite Score
2. Metrics: h-index, g index, i10 index, altmetrics

PHSCS-103: Compulsory / Optional Paper**50 Marks****a) Advanced Concepts of Artificial Intelligence:**

Definition of Intelligence, Importance of AI, Problems of AI, Impact of AI, Approaches to AI, Agent and Environment, Multi Agent Systems, Soft Computing, Hard Computing, Problem Solving using LISP and PROLOG, Fuzzy Logic, Neural Networks, Knowledge Acquisition Methods, Explanation Methods, Expert System Shells.

b) Mathematical Models and Algorithms:

Introduction, Formulation of a problem, Proof techniques, Studies on standard statistical modeling Divide and Conquer, Dynamic Programming, Greedy Algorithms, Backtracking and Branch – and – Boun, Approximate Algorithms, Complexity of different algorithms.

c) Cryptography and Network Security:

Introduction to security, Security Attacks, Services, Mechanisms, Security Services, Model for Network Security, Internet Standards, Conventional Encryption Principles, Conventional Encryption Algorithms, Message Confidentiality, Cipher Block Modes of Operations, Advanced concepts of Cryptographic Algorithms, Key Distribution, Key Generation Algorithms, Elliptic Curve Cryptography, Kerberos.

d) Natural Language Processing:

Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, knowledge representation, Introduction to semantics, Machine Translation, Computational Linguistics, Information Retrieval

e) Introduction to Bio-Informatics:

Introduction, Understanding Sequence Matching, Knowledge of Repositories and Different Tools for Analysis, Models and Algorithms for Analysis, Understanding Different File Formats, Analyzing Primary and Secondary Structures of Different Polymers.

BOOKS (Artificial Intelligence):

1. Introduction to A.I. & E.S. by D.W. Patterson, PHI.
2. Introduction to A.I. by Rich & Knight
3. Principle of A.I., by N.J. Nilson, Narosa.

BOOKS (Algorithms):

1. Introduction to Algorithms: Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, MIT
2. Design and Analysis of Algorithms: Parag Himanshu Dave, Himanshu Bhalchandra Dave, Pearson
3. Algorithm Design: Jon Kleinberg, Éva Tardos, Pearson Education
4. Fundamentals of Computer Algorithms: Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, University Press

BOOKS (Cryptography and Network Security):

1. William Stallings, *Network Security Essentials Applications and Standards*, Pearson Education
2. Kaufman, *Network Security: Private Communication in a Public World*, Pearson Education
3. William Stallings, *Cryptography and Network Security*, Pearson Education.
4. Menezes, Oorschot, Vanstone, “**Handbook of Applied Cryptography**”, CRC press, Fifth Printing.
5. Schneier Bruce, “**Applied Cryptography**”, Wiley India (P.) Ltd., Second Edition.

BOOKS (NLP):

1. Natural Language Processing and Information Retrieval: U. S. Tiwary, Tanveer Siddiqui
2. Statistical Machine Translation: Philipp Koehn
3. Computational Linguistics: R., Grishman, Cambridge University Press
4. Introduction to Information Retrieval: Manning, C.D., Raghavan, P. and Schütze

BOOKS (Bio-Informatics)

1. **Introduction to Bioinformatics** 3rd Edition by Arthur Lesk (Author)
2. **Structural Bioinformatics**, 2nd Edition, Jenny Gu (Editor), Philip E. Bourne (Editor)

PHSCS-104: Term Paper (S) & Related Seminar Presentation (S) (25+25 = 50 Marks)

The first meeting of RAC (Research Advisory Committee) is held on 10 / 08 / 2010 in the chamber of HOD of Dept. of Comp. SDC., The University of Burdwan to consider following agenda:

- i. Framing syllabus of research methodology for PhD in Comp. Sc.
- ii. Old cases referred by Secretary, Faculty of Science, B. U.
- iii. AOM (Any Other Matters)

The following members were present in the meeting:

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)

Agenda: