Syllabus of Ph.D. Course Work

[2020-2021]

Department of Information and Communication Technology,

Fakir Mohan University, Vyasa Vihar,

Balasore-756019, Odisha.

Syllabus of Ph.D. Course Work in

Information and Communication Technology

(2020-2021)

COURSE STRUCTURE

Code	Paper Title	Credit	Marks
DPICT-101	Research Methodology and Computer Applications	6	100
DPICT-102	Recent Advances in ICT	6	100
DPICT-103	Research and Publication Ethics	2	50
DPICT-104	Literature Review (Including Book Review related to the Proposed topic)	6	100
DPICT-105	Preparation of Research Proposal/ Synopsis	4	50
	Total	**24**	**400**

DPICT-101: RESEARCH METHODOLOGY AND COMPUTER APPLICATIONS				
Sub. Code	**Subject Name**	**Credit**	**Int. Mark**	**Ext. Mark**
DPICT-101	Research Methodology and Computer Applications	6	40	60

Objectives	i. To understand some basic concepts of research and its methodologies. ii. To identify appropriate research topics. iii. To select and define appropriate research problem and parameters. iv. To prepare a project proposal (to undertake a project). v. To organize and conduct research in a more appropriate manner. vi. To write a research report and thesis. vii. To learn the data collection and sampling methods viii. To learn about the data analysis and sampling techniques and the tools
Pre-Requisites	Knowledge of programming and basic statistics
Teaching Scheme	ICT enabled regular classroom lectures with an emphasis on interactive learning.

Detail Syllabus

Unit I: Introduction: Meaning and Objectives of Research, Research Approaches, Types of Research, Research Process, Criteria of Good Research.

Unit II: Defining Research Problem, and Research Design: What is a Research Problem? Selecting the Problem, Technique Involved in Defining a Problem, Meaning of Research Design, Need for Research Design, Features of a Good Design, Different Research Designs, Basic Principles of Experimental Designs.

Unit III: **Data Collections and Sampling:** Primary and secondary data, Methods of collecting primary data, Sources of secondary data. Population and Sample, Sample survey and Census Survey, Different methods of sampling.

Unit IV: Data Analysis and Interpretation: Exploratory data analysis, Univariate analysis, Test of significance. Large sample tests (z-test), Small sample test (t-test), Bivariate analysis, F-test, x^2 –test, Analysis of variance, (ANOVA), One way ANOVA, Two way ANOVA, Multivariate analysis, Correlation and Regression, Factor Analysis, Cluster Analysis, Non-Parametric Tests of Significance. Meaning of Interpretation, Why Interpretation, Technique of Interpretation, and Precaution in Interpretation.

Unit V: Software Tools: MATLAB, R, Python, Latex,

Report Writing: Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

Text Books:

1. C. R. Kothari, Research Methodology: Methods and Techniques, 3rd Ed., New Age International Pvt. Ltd.
2. Paul D. Leedy, Practical Research: Planning & Design, Prentice Hall
3. https://in.mathworks.com/support/learn-with-matlab-tutorials.
4. https://www.python.org/
5. https://www.r-project.org/
6. *https://www.latex-project.org*

Reference Books:

7. S. C. Gupta, Fundamentals of Statistics, Himalaya Publishing

Course Outcome	At the end of this course, the Researchers will be able to i. Develop an appropriate framework for research studies. ii. Explain key research concepts and issues. iii. Read, comprehend, and explain research articles in their academic discipline. iv. Develop the skill and ability to apply the methods/software tools while working on a research project work. v. Learn how to use different software tools for model building, results analysis, and report writing. vi. To collect, analyze, and interpret data using various tools.

DPICT-102: RECENT ADVANCES IN ICT				
Sub. Code	**Subject Name**	**Credit**	**Int. Mark**	**Ext. Mark**
DPICT-102	Recent Advances in ICT	6	40	60

Objectives	The objective of the course is to introduce the scholars about the i. Advancements in the field of Artificial Intelligence and Machine Learning ii. Concepts, characteristics, models and benefits of cloud computing. iii. Concepts, Scopes and Applications of Bioinformatics iv. Different aspects of Cryptography and Network Security v. Latest Techniques of various methods of Image Processing
Pre-Requisites	Data Structure, Computer Networks, Number theory, Computer Architecture
Teaching Scheme	ICT enabled regular classroom lectures with an emphasis on interactive learning.

Detail Syllabus

Unit I: Introduction to Artificial Intelligence and Machine Learning: Artificial Intelligence: What is AI? History of AI, Blind and Heuristic Search (Hill Climbing, Simulated Annealing), Constraint Satisfaction Problems, Bayesian Network, Applications of Artificial Intelligence.

Machine Learning: What is ML?, supervised and unsupervised learning, Decision tree, Statistical learning models, learning with complete data - Naive Bayes models.

Unit II: Cloud Computing: Cloud Computing Fundamentals: Cloud Computing definition, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Evolution of Cloud Computing, Applications cloud computing, Business models around Cloud – Major Players in Cloud Computing, Issues in Cloud.

Unit III: Introduction to bioinformatics: Scope and applications of bioinformatics, Alignment of pairs of sequences; Introduction- Definition of sequence alignment, Methods - Dot matrix sequence comparison.

Unit IV: Cryptography and Network Security: Introduction to Cryptography and network security: Security Threats, Vulnerability, attacks, Security services and mechanism, Conventional Encryption Model, CIA model, Symmetric and Public-Key Cryptosystems, Steganography, Digital Signatures.

Unit V: Digital Image Processing: Introduction: Motivation & Perspective, Recent Advancements, Applications, Components of Image Processing System, Fundamentals Steps in Image Processing, Image Sampling and Quantization, Some basic relationships like Neighbors, Connectivity, Distance Measures between pixels, Image Enhancement in the Spatial and frequency domain.

Text Books:

1. J.-S.R. Jang, C.-T. Sun, E.Mizutani, Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, PHI, 2004
2. Stuart Russell, Peter Norvig, Artificial Intelligence – A Modern Approach, Pearson Education
3. Tom M. Mitchell, Machine Learning, McGraw-Hill, 2010 .
4. Anthony T.Velte , Toby J. Velte, Robert Elsenpeter , Cloud computing a practical approach -, TATA McGraw- Hill , New Delhi – 2010
5. John W. Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2017.
6. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Que 2008.
7. David W.Mount, Bioinformatics: Sequence and Genome Analysis.
8. Hooman H Rashidi, Lukas K Buehler. Bioinformatics Basics -2000.
9. Krane, D. E. and Raymer, M. L., "Fundamental Concepts of Bioinformatics", Benjamin Cummings, 2005.
10. Per Jambeck, Cynthia Gibas. Developing Bioinformatics Computer Skills. Computers – 2001.
11. Oded Goldreich, Fundamentals of Cryptography, Cambridge University Press
12. William Stallings, Cryptography and Network security Principles and Practices, Pearson/PHI, 6th ed.
13. B.A. Forouzan & D. Mukhopadhyay, Cryptography and Network Security, McGraw Hill, 4th ed.
14. Eric Maiwald, Fundamentals of Network Security, Dreamtech press.

15. Gonzalez Rafael C. and Woods Richard E., Digital Image Processing, New Delhi: Prentice–Hall of India.
16. A.K. Jain “Fundamental of digital image processing”, Prentice-Hall

Course Outcome	At the end of this course, the Researchers will be able to know i. Use of different machine learning techniques ii. The concept of cloud, Cloud services, its benefits and challenges. iii. Evolution of Cloud Computing & Applications cloud computing. iv. Business models around Cloud & Major Players in Cloud Computing. v. Applications of Bioinformatics vi. Development of cryptosystems and secure communication techniques. vii. Use of Image processing techniques for image analysis.

DPICT- 103: RESEARCH AND PUBLICATION ETHICS

Sub. Code	Subject Name	Credit	Int. Mark	Ext. Mark
DPICT-103	Research and Publication Ethics	2	20	30

Objectives	i. Provide students with the fundamental knowledge of basics of philosophy of science and ethics, research integrity, publication ethics. ii. Hands-on sessions are designed to identify research misconduct and predatory publications. iii. Guide and mentor students in presenting plagiarism tools for a valid and ethical research report.
Pre-Requisites	Basic knowledge of accessing web resources.
Teaching Scheme	ICT enabled regular classroom lectures with an emphasis on interactive learning.

Detail Syllabus

Unit I: Philosophy and ethics and Scientific Conduct: Introduction to philosophy: definition, nature and scope, concepts and branches, Ethics: Definition, Moral Philosophy, Nature of moral judgments and reactions. Ethics with respect to science and research, Intellectual honesty and research integrity, scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP),

Unit II: Publication Ethics: Definition, Introduction and Importance. **Redundant Publication:** duplicate and overlapping publications, salami slicing, Conflicts of interest, Predatory Publishers and Journals.

Unit III: Open Access Publishing: Open access publications and initiatives, SHERPA/RoMEO online resource to check publisher copyright and self-archiving policies. Journal finders, journal suggestion tools.

Unit IV: Publication Misconduct: Subject specific ethical issues, FFP, authorship, conflicts of interest, use of plagiarism software tools like Turnitin and other open source software tools.

Unit V: Database and Research Metrics: Indexing databases, Citation databases-WoS, Scopus, DBLP, IF, SNIP, SJR, Cite Score, h-index, i10 index, g-index, altmetrics.

Text Books /References:

1. D. B. Resnik, what is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10, 2011. Retrieved from https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm
2. P. Chaddah, Ethics in Competitive Research: Do not get scooped: do not get plagiarized, 2018 ISBN:978-9387480865
3. Patwardhan B., Desai A., Chourasia A, Nag S., Bhatnagar R. 2020. Guidance Document: Good Academic Research Practices. New Delhi: University Grants Commission.
4. Academic Integrity and Research Quality, https://www.ugc.ac.in/e-book/Academic and Research/mobile/index.html
5. Consortium for Academic Research and Ethics CARE, source: https://www.ugc.ac.in/e-book
8. Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance (2019), ISBN:978-81-939482-1-7. http://insaindia.res.in/pdf/Ethics_Book.pdf.

Course Outcome	At the end of this course, the Researchers will be able to understand i. About the publication ethics and publication misconducts ii. Indexing and citation databases, open access publications, research metrics (citations, h-index, impact Factor, etc.).

DPICT-104: LITERATURE REVIEW (INCLUDING BOOK REVIEW RELATED TO THE PROPOSED TOPIC)			
Sub. Code	**Subject Name**	**Credit**	**Mark**
DPICT-104	Literature Review (Including Book Review related to the Proposed topic)	6	100

Objectives	The objective of this course is to teach the scholars how to perform i. Scientific research reviews ii. Book reviews
Pre-Requisites	NA
Teaching Scheme	ICT enabled regular classroom lectures with an emphasis on interactive learning.

Detail Syllabus

This paper is consisting of TWO parts.

In part 1, students are required to undergo for an extensive literature survey in one of the areas of Computer Science (CS), Information Technology (IT), Information and Communication Technology (ICT). The outcome of this work shall be disseminated in shape of a review paper/survey paper published in at least Peer Reviewed/Scopus Indexed Journals.

In part 2, students are required to undertake an extensive book review in one of the areas of Computer Science (CS), Information Technology (IT), Information and Communication Technology (ICT). The outcome of this work shall be disseminated in shape of a review paper/survey paper published in at least Peer Reviewed/Scopus Indexed Journals.

Text Books/References:

1. http://www.cs.ucf.edu/~lboloni/Teaching/EEL6788_2008/slides/SurveyTutorial.pdf

2. https://cs.pomona.edu/classes/cs190/survey_workshop_slides.pdf
3. http://cs.swan.ac.uk/~csbob/research/star/how/mcnabb19how.pdf

Course Outcome	At the end of this course, the scholars will be able to publish a minimum of one review paper/survey paper published in at least some Peer Reviewed/Scopus Indexed Journals.

DPICT-105: PREPARATION OF RESEARCH PROPOSAL/ SYNOPSIS			
Sub. Code	**Subject Name**	**Credit**	**Mark**
DPICT-104	Preparation of Research Proposal/ Synopsis	4	50

Objectives	The objective of this course is to teach the scholars how to i. prepare synopsis for Ph.D. registration ii. write research proposals
Pre-Requisites	NA
Teaching Scheme	ICT enabled regular classroom lectures with an emphasis on interactive learning.

Detail Syllabus

In this paper students are required to acquire skill to develop: i) a meaningful synopsis for Ph.D. registration, and ii) competitive research/project proposal.

Text Books/References:

1. https://www.westminster.ac.uk/study/postgraduate/research-degrees/entry-requirements/how-to-write-your-research-proposal
2. https://science.yalecollege.yale.edu/fellowships/how-write-proposal

Course Outcome	At the end of this paper, the scholars will be able to i. Write a meaningful synopsis for their PhD registration. ii. Write research proposals for different funding agencies