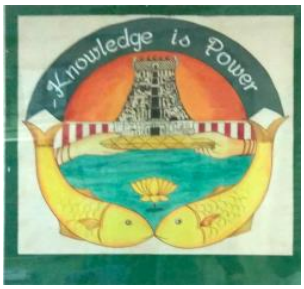
SRI MEENAKSHI GOVT. ARTS COLLEGE FOR WOMEN
(AUTONOMOUS)
MADURAI – 625 002.



PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Phil. Computer Science

SYLLABUS INTRODUCED FOR THE ACADEMIC YEAR
2021 – 2022

UNDER C.B.C.S.

SRI MEENAKSHI GOVT. ARTS COLLEGE FOR WOMEN
(AUTONOMOUS)
MADURAI – 625 002.

PG AND RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M.Phil. Computer Science Syllabus - CBCS
(For those who are admitted from June 2019 onwards)

	Sub. Code	Title of the Paper	Marks			Credits
			Int.	Ext	Total	
I – Semester						
Core Paper-1	**MPSA1**	**Research Methodology**	**40**	**60**	**100**	**5**
Core Paper-2	**MPSA2**	**Soft Computing**	**40**	**60**	**100**	**5**
Elective Papers			**40**	**60**	**100**	**5**
Option-1	**MPSE1**	**Data Mining and Warehousing**				
Option-2	**MPSE2**	**Digital Image processing and Machine Vision**				
Option-3	**MPSE3**	**Big Data Analytics**				
Option-4	**MPSE4**	**Wireless Sensor Networks**				
II – Semester						
	MPSPW	**Dissertation and Viva-voce**	**25**	**75**	**100**	**21**
Total					**400**	**36**

(This syllabus will come into effect from the Academic Year 2019-2020 onwards)

- The programme will consist of two semesters with 36 credits.
- In the First Semester there will be three papers, with 5 credits each.

a. Research Methodology
b. Soft Computing
c. Elective Course related to the Dissertation Work

- In the Second Semester the students will have to do a dissertation with 21 credits

The last date for the submission of dissertation is on or before 31st July. Attendance is compulsory. Fieldwork and library visits pertaining to research can be done with prior permission.

EVALUATION PATTERN FOR M. Phil PROGRAMME

THEORY PAPER

Internal

BLOOM'S TAXANOMY	INTERNAL	EXTERNAL
KNOWLEDGE	50%	50%
UNDERSTANDING	30%	30%
APPLY	20%	20%

Assessment for Semester I

Two Monthly Tests	:	2 x 10 = 20 Marks
Model Exam	:	1 x 10 = 10 Marks
Seminar and Assignment	:	10 Marks
Total	:	40 Marks

External Question paper Pattern for Core and Elective Courses:

Section A	5 / 8 Questions (8 Questions ; at least one question from each unit; open choice; 12 marks each)	**60**
	Total	**60**

Duration of Examination : 3 Hours
Maximum Marks : 60 Marks

Internal : No Minimum
External : 27 / 60

Internal & External : 50%

Semester II: M. Phil., Project (Dissertation) Marks

Internal **:** 25 Marks
External **:**
Report **:** 50 Marks
Viva : 25 Marks

Mapping Matrix for Subjects

Mapping	1-20%	21-40%	41-60%	61-80%	81-100%
Scale	1	2	3	4	5
Relation	0.0-1.0	1.1-2.0	2.1-3.0	3.1-4.0	4.1-5.0
Quality	Very Poor	Poor	Moderate	High	Very High
Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of POs \& PSOs}}$			Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$		

Programme : M. Phil Computer Science **Part III : Core**

Semester : I **Hours : 5 P/W 75 Hrs**

Subject Code : MPSA1 **P/S**

Credits : 5

TITLE OF THE PAPER: RESEARCH METHODOLOGY

Pedagogy	**Hours**	**Lecture**	**Peer Teaching**	**GD/VIDOES/TUTORIAL**	**ICT**
	5	**2**	**1**	**1**	**1**

PREAMBLE:

- To improve the problem solving skills
- To impart the thesis writing skills.
- To focus on research tools and techniques.
- To understand the Research Ethics

COURSE OUTCOME At the end of the Semester, the Students will be able to		**Hrs P/S**
UNIT 1	**CO1:** What do you mean by Research Methodology. Define the Research Problem and Research Design.	**15**
UNIT 2	**CO2:** Define the Research Problem and Research Design.	**15**
UNIT 3	**CO3:** Explain the Methods of Data Collection, Interpretation and Report Writing.	**15**
UNIT 4	**CO4:** Demonstrate the Technical Documentation and Report Writing using Latex Tools. .	**15**
UNIT 5	**CO5:** Experiment the issues with Research Ethics.	**15**

Programme : M. Phil Computer Science	**Part III : Core**
Semester : I	**Hours : 5 P/W 75 Hrs**
Subject Code : MPSA1	**P/S**
	Credits : 5

TITLE OF THE PAPER: RESEARCH METHODOLOGY

UNIT I: Research Methodology

Introduction: Meaning of Research - Objectives of Research - Motivation in Research - Types of Research - Research Approaches - Significance of Research - Research Methods versus Methodology - Research and Scientific Method - Importance of Knowing How Research is Done - Research Process - Criteria of Good Research - Problems Encountered by Researchers in India.

UNIT II: Research Methodology

Defining the Research Problem: What is a Research Problem - Selecting the Problem - Necessity of Defining the Problem - Technique Involved in Defining a Problem.

Research Design: Meaning of Research Design - Need for Research Design - Features of a Good Design - Important Concepts Relating to Research Design - Different Research Designs - Basic Principles of Experimental Designs.

Case Study: Identifying the Research Domain and Finding the Research Gaps

UNIT III: Research Methodology

Methods of Data Collection: Collection of Primary Data - Observation Method - Interview Method - Collection of Data through Questionnaires - Collection of Data through Schedules - Difference between Questionnaires and Schedules - Some Other Methods of Data Collection - Collection of Secondary Data - Selection of Appropriate Method for Data Collection - Case Study Method.

Interpretation and Report Writing: Meaning of Interpretation - Why Interpretation - Technique of Interpretation - Precaution in Interpretation - 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.
Case Study: Data Collection for particular Application Domain, Journal Paper and Conference Paper Preparations and sample Reports generation.

UNIT IV: Technical Documentation and Report Writing:

Introduction to Latex: Produce a Simple Document, Deal with Complicating features in a Document, More Complicating Features in a Document, Figures and Tables, Cross-References, Index and Bibliography – Special Characters.

Programme : M. Phil Computer Science	**Part III : Core**
Semester : I	**Hours : 5 P/W 75 Hrs P/S**
Subject Code : MPSA1	**Credits : 5**

Case Study: Documentation using Latex.

UNIT V: **Research and Publication Ethics:** Ethics of Research – Collaborative Research and Sharing of Research – Research Supervisor and Student Relationship – Ethics of Publications: Authors and Contributors – Undesirable Authorships – General Responsibilities of Authors - Ethical conventions – Where to Publish – Pre-Print Archives – Peer Reviewed Scholarly Journals. Intellectual honesty and research integrity - Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) - Redundant Publications: duplicate and overlapping publications, and misrepresentation of data.

Case Study: Analyze the plagiarism report generated using standard tools (eg., URKUND)

REFERENCE BOOKS

1. Research Methodology Methods and Techniques by C.R. Kothari, Second Revised Edition, New Age international publishers, 2004.
2. LATEX for Beginners by K.B.M.Nambudiripad, Alpha Science International, 2014.
3. Guide to latex By Helmut Kopka, Patrick W. Daly, Addison-Wesley Professional Ltd., 4th Edition, 2004.
4. Ethics in Science Education, Research and Governance Edited by KambadurMuralidhar, Amit Ghosh Ashok Kumar Singhvi. Indian National Science Academy, 2019. ISBN : 978-81-939482-1-7.
5. https://www.mdpi.com/2304-6775/1/3/87/pdf
6. The International Journal of Educational Research, ISSN: 0883-0355, Copyright 2021 Elsevier Ltd.

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
	UNIT 1		
1.	Meaning of Research - Objectives of Research - Motivation in Research.	2	Lecture
2.	Types of Research - Research Approaches	2	Lecture
3.	Significance of Research & Research Process	2	Videos (ICT)
4.	Research Methods versus Methodology - Research and Scientific Method.	2	Lecture
5.	Importance of Knowing How Research is Done.	2	
6.	Research Process - Criteria of Good Research.	2	Videos
7.	Problems Encountered by Researchers in India.	1	Group Discussions
8.	Discussions	2	Group Discussions
	UNIT II		
9.	Defining the Research Problem: Introduction, What is a Research Problem - Selecting the Problem.	2	ICT (NPTEL Notes)
10.	Necessity of Defining the Problem	2	Peer Teaching
11.	Technique Involved in Defining a Problem	2	Lecture
12.	Research Design: Need for Research Design - Features of a Good Design - Different Research Designs	2	Tutorial, ICT (Lecture Notes)
13.	Important Concepts Relating to Research Design	2	Lecture
14.	Basic Principles of Experimental Designs	2	Videos
15.	Identifying the Research Domain.	2	Group Discussions
16.	Finding the Research Gaps.	1	Group Discussion
	UNIT 11I		
17.	Methods of Data Collection.	2	Lecture
18.	Journal and Conference Papers related to the above discussion.	2	Group Discussion (Digital Library)
19.	Research Interpretations: Meaning of Interpretation - Why Interpretation - Technique of Interpretation.	2	ICT (NPTEL Notes)
20.	Precaution in Interpretation.	2	Lecture
21.	Significance of Report Writing - Different Steps in Writing Reports.	1	Lecture
22.	Layout of the Research Report.	2	Peer Teaching

23.	Types of Reports - Oral Presentation - Mechanics of Writing a Research Report.	1	Videos
24.	Precautions for Writing Research Reports.	1	Group Discussion
25.	Case Study: Data Collection for particular Application Domain, Journal Paper and Conference Paper Preparations and sample Reports generation.	2	Group Discussion
UNIT IV			
26.	Introduction to Latex	2	Lecture
27.	Produce a Simple Document	2	Lecture (Demo)
28.	Deal with Complicating features in a Document	2	Videos
29.	More Complicating Features in a Document	2	Lecture (Demo)
30.	Cross References and Preparation of Sample Reports	2	ICT (NPTEL Notes)
31.	Index and Bibliography – Special Characters	1	Peer Teaching
32.	Sample Conference and Journal Paper Preparation	2	Tutorial
33.	Documentation using Latex.	2	Peer Teaching
UNIT V			
33.	Ethics with respect to Science and Research	3	Lecture
34.	Intellectual honesty and research integrity	3	Lecture
35.	Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP)	3	Lecture & ICT (NPTEL Notes)
36.	Redundant Publications: duplicate and overlapping publications, salami slicing	2	Peer Teaching
37.	Selective reporting and misrepresentation of data	2	Videos
38.	Paper writing and Hands on training with Plagiarism Tools	2	Peer Teaching

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	3	3	4	3	4	4	3	3.3
CO2	3	4	3	3	3	4	3	4	4	3	3.4
CO3	3	4	4	4	3	4	3	4	4	4	3.7
CO4	4	4	4	4	3	4	3	4	4	4	3.8
CO5	4	4	4	4	4	4	3	4	4	4	3.9
Mean Overall Score											3.62

Result: The Score for this Course is 3.62 (High Relationship)

COURSE DESIGNERS:

1. **Dr. M. SUMATHI, Associate Professor, PG and Research Department of Computer Science.**

2. **Dr. S. SUGUNA, Assistant Professor, PG and Research Department of Computer Science.**

3. **Mrs. G. SUDHA, Assistant Professor, PG and Research Department of Computer Science**

Programme : M. Phil Computer Science **Part III : Core**

Semester : I **Hours : 5 P/W 75 Hrs**

Subject Code : MPSA2 **P/S**

Credits : 5

TITLE OF THE PAPER: SOFT COMPUTING

Pedagogy	Hours	Lecture	Peer Teaching	GD/VIDOES/TUTORIAL	ICT
	5	2	1	1	1

PREAMBLE:

To understand the basics of Neural Network, Fuzzy Sets, Evolutionary Computing Paradigm and their applications to optimization problems.

	COURSE OUTCOME At the end of the Semester, the Students will be able to	**Hrs P/S**
UNIT 1	**CO1:** Define the basic concepts and techniques of Soft Computing	**15**
UNIT 2	**CO2:** Compare Biological and Artificial Neural Network and Explain the types of Neural Networks	**15**
UNIT 3	**CO3:** Make use of various fuzzy models in developing fuzzy inference systems to be appropriate with specific real time problems	**15**
UNIT 4	**CO4:** Utilize genetic algorithms to combinatorial optimization problems	**15**
UNIT 5	**CO5:** Make use of Optimization techniques Swam Intelligence and Ant colony optimization	**15**

Programme : M. Phil Computer Science	**Part III : Core**
Semester : I	**Hours : 5 P/W 75 Hrs**
Subject Code : MPSA2	**P/S**
	Credits : 5

TITLE OF THE PAPER: SOFT COMPUTING

UNIT I :

Introduction to Soft Computing – Introduction , Artificial Intelligence, Artificial Neural Networks, Fuzzy Systems, Genetic Algorithm and Evolutionary Programming, Swarm Intelligent Systems, Expert Systems.

UNIT II:

Artificial Neural Networks–First Generation - Introduction to Neural Networks, Biological Inspiration, Biological Neural Networks to Artificial Neural Networks, Classification of ANNs, First-generation Neural Networks.

UNIT III:

Fuzzy Logic - Introduction to Fuzzy Logic, Human Learning Ability, Imprecision, and Uncertainty, Undecidability, Probability Theory vs Possibility Theory, Classical Sets and Fuzzy Sets, Fuzzy Set Operations, Fuzzy Relations, Fuzzy Composition.
Fuzzy Logic Applications : Introduction to Fuzzy Logic Applications, Fuzzy controllers.

UNIT IV :

Genetic Algorithms and Evolutionary Programming - Introduction to Genetic Algorithms, Genetic Algorithms, Procedures of GAs, Genetic Representations, Selection, Genetic Operators, Mutation, Natural Inheritance Operators.

UNIT V:

Introduction to Swarm Intelligence - Background of Swarm Intelligent Systems, Ant Colony System, Ant Colony Optimisation.

REFERENCE BOOK(S):

1. Soft computing with MATLAB programming, N.P.Padhy, S.P.Simon, Oxford University Press, First Edition, 2015

2. Principles of Soft computing, S.N.Sivanandam and S.N.Deepa, Wiley India Edition, 2nd Edition, 2013.
3. Neural Networks, Simon Haykin, Pearson Education, 2003.
4. Fuzzy Logic – Intelligence Control & Information , John Yen & Reza Langari, Pearson Education, New Delhi, 2003
5. Artificial Intelligence and Intelligent Systems , N.P.Padhy, Oxford University Press, 2013.

Programme : M. Phil Computer Science **Part III : Core**

Semester : I **Hours : 5 P/W 75 Hrs**

Subject Code : MPSA2 **P/S**

Credits : 5

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1 : Introduction to Soft Computing			
1.	Introduction Artificial Intelligence	2	Lecture
2.	Artificial Neural Networks	3	ICT(Lecture Notes)
3.	Fuzzy Systems	3	Lecture
4.	Genetic Algorithm and Evolutionary Programming	1	Lecture
5.	Swarm Intelligent Systems	4	ICT(PPT)
6.	Comparative Study of Basic Techniques	2	(Group Discussion) Digital Library
UNIT 11 : Artificial Neural Networks–First Generation			
7.	Introduction to Neural Networks	1	Lecture
8.	Biological Inspiration, Biological Neural Networks to Artificial Neural Networks	3	ICT(PPT)
9.	Classification of ANN	3	Lecture
10.	First-generation Neural Networks	3	ICT(PPT)
11.	Data Generalization by Attribute - Oriented Induction	2	Lecture
12.	Journal Papers Survey of Neural Network Applications	3	Paper Survey Google Scholar
UNIT III : Fuzzy Logic			
13.	Introduction to Fuzzy Logic, Human Learning Ability, Imprecision, and Uncertainty, Undecidability	3	Lecture
14.	Probability Theory vs Possibility Theory	2	ICT(Lecture Notes)
15.	Classical Sets and Fuzzy Sets, Fuzzy Set Operations, Fuzzy Relations, Fuzzy Composition	3	Lecture
16.	**Fuzzy Logic Applications :** Introduction to Fuzzy Logic Applications, Fuzzy controllers.	3	ICT(Videos)
17.	Fuzzy Logic Applications – A Survey Report	4	Google Scholar
UNIT IV : Genetic Algorithms and Evolutionary Programming			
18.	Introduction to Genetic Algorithm	2	Lecture
19.	Genetic Algorithms	2	Lecture
20.	Procedures of GAs, Genetic Representations, Selection, Genetic Operators, Mutation, Natural Inheritance Operators	9	ICT (Lecture Notes), Digital Library

21.	Genetic Algorithm Case Study Problems	2	Lecture
UNIT V : Introduction to Swarm Intelligence			
22.	Background of Swarm Intelligent Systems	4	Lecture
23.	Ant Colony System	4	ICT (PPT)
24.	Ant Colony Optimization	2	Lecture
25.	Swarm Intelligence Application problems – A Study	5	Group Discussion Digital Library

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	4	4	4	3	4	3	4	4	4	3.7
CO2	3	4	4	4	3	4	3	4	4	4	3.7
CO3	3	4	4	4	3	4	3	4	4	4	3.7
CO4	3	4	4	4	3	4	3	4	4	4	3.7
CO5	3	4	4	4	4	4	3	4	4	4	3.8
Mean Overall Score											3.72

Result: The Score for this Course is 3.72 (High Relationship)

COURSE DESIGNERS:

1. **Dr. G.SUJATHA**
Associate Professor, PG and Research Department of Computer Science.

2. **Mrs. A. S. BABY RANI**
Associate Professor, PG and Research Department of Computer Science

Semester : I **Hours : 5 P/W 75 Hrs**

Subject Code : MPSE1 **P/S**

Credits : 5

TITLE OF THE PAPER: DATA MINING AND WAREHOUSING

Pedagogy	**Hours**	**Lecture**	**Peer Teaching**	**GD/VIDOES/TUTORIAL**	**ICT**
	5	**2**	**1**	**1**	**1**

PREAMBLE:

To understand the essence of data warehousing and mining and explore the various underlying techniques.

To focus applications and trends in Data Mining.

COURSE OUTCOME At the end of the Semester, the Students will be able to		**Hrs P/S**
UNIT 1	**CO1:** Define the Data Mining Basics, Reason and Issues with Preprocessing Phase.	**15**
UNIT 2	**CO2:** Explain Data Warehousing and Online Analytical Processing and Data Warehouse Modeling.	**15**
UNIT 3	**CO3:** Outline the methods of Mining Frequent Patterns, Associations and Correlations	**15**
UNIT 4	**CO4:** Summarize the purpose of various Classification algorithms.	**15**
UNIT 5	**CO5:** What do you mean by Cluster Analysis, Outlier Detection, and Data Mining Applications.	**15**

Programme : M. Phil Computer Science **Part III : Elective**

Semester : I **Hours : 5 P/W 75 Hrs P/S**

Subject Code : MPSE1 **Credits : 5**

TITLE OF THE PAPER: DATA MINING AND WAREHOUSING

UNIT I: Data Mining Basics and Preprocessing

Introduction: What Is Data Mining? – What Kind of Data can be mined?: Database Data, Data Warehouses, Transactional Data, Other kinds of Data - What Kind of Patterns can be mined?: Class/concept description characterization and discrimination, Mining frequent patterns, associations and correlations, Classification and regression for predictive analysis, Cluster analysis, outlier analysis, Are all patterns interesting? – Which Technologies are used?: Statistics, Machine learning, Database systems and Data warehouses, Information Retrieval – Major Issues in Data Mining: Mining methodology, User interaction, Efficiency and Scalability, Diversity of Database types, Data mining and society.

Getting to know your data: Data Objects and Attribute Types: What is an attribute?, Nominal attributes, Binary attributes, Numeric Attributes, Discrete versus Continuous attributes – Basic Statistical Description of Data: Measuring the central tendency: Mean, Median, Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Interquartile Range, Graphic displays of basic statistical descriptions of data.

Data Preprocessing: An Overview: Data Quality, Major tasks in Data preprocessing – Data Cleaning: Missing values, Noisy data, Data cleaning as a process – Data Integration: Entity Identification problem, Redundancy and Correlation Analysis, Tuple duplication, Data value conflict detection and resolution– Data Reduction: Overview, Wavelet Transforms, Principal components analysis, Attribute subset selection, Regression and log-linear models, Histograms, Clustering, Sampling, Data cube aggregation – Data Transformation and Data Discretization: Data Transformation strategic overview, Data transformation by normalization, Discretization by binning, Discretization by Histogram analysis, Discretization by Cluster, Decision Tree, and Correlation analysis, Concept hierarchy generation for nominal data.

UNIT II: Data Warehousing

Data Warehousing and Online Analytical Processing: Basic Concepts: What is Data Warehouse, Differences between operational systems and Data Warehouses, But, why have a separate Data Warehouse?, Data warehousing: A multitier architecture, Data Warehouse models: Enterprise Warehouse, Data Mart, and Virtual Warehouse, Extraction, Transformation, and loading, Metadata repository.

Data Warehouse Modeling: Data Cube and OLAP: Data Cube: A multidimensional data model, Stars, Snowflakes, and Fact Constellations, Dimensions, Measures, typical OLAP operations, A starnet query model for querying multidimensional databases - Data Warehouse Implementation: Efficient Data cube computation, Indexing OLAP Data: Bitmap index and join index, Efficient processing of OLAP queries, OLAP server architectures: ROLAP versus MOLAP versus HOLAP -

Data Generalization by Attribute-Oriented Induction: Attribute-Oriented Induction for data characterization, Efficient implementation of attribute-oriented induction, attribute-oriented induction for class comparisons.

UNIT III: Association Rule Mining

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and methods: Basic Concepts: Market basket analysis, Frequent itemsets, closed itemsets and association rules – Frequent Item set Mining Methods: Apriori algorithm: finding frequent itemsets by confined candidate generation, Generating association rules from frequent itemsets, Improving the efficiency of Apriori, A pattern-Growth approach for mining frequent itemsets, Mining frequent itemsets using vertical data format, Mining closed and max patterns – Which Patterns Are Interesting? – Pattern Evaluation Methods: Strong rules are not necessarily interesting, from association analysis to correlation analysis, a comparison of pattern evaluation measures.

UNIT IV: Calssification

Classification: Basic Concepts: What is classification?, General approach to classification – Decision Tree Induction: Decision tree induction, Attribute selection measures: Information gain, Gain ratio, Gini Index, Other attribute selection measures, Tree pruning, Scalability and Decision tree induction, Visual mining for decision tree induction – Bayes Classification Methods: Bayes theorem, Naïve Bayesian classification.

Classification Advanced Methods: Bayesian Belief Networks: Concepts and mechanisms, Training Bayesian belief networks – Classification by Back Propagation: A multilayer feed-forward neural network, defining a network topology, Backpropagation – Support Vector Machines: The case when the data are linearly separable, the case when the Data are linearly inseparable.

UNIT V: Cluster Analysis, Data Mining Applications and Data Analytics with R Programming

Cluster Analysis: Basic Concepts and Methods: Cluster Analysis: What is cluster analysis?, Requirements for cluster analysis, Overview of basic clustering methods – Partitioning Methods: k-Means: A centroid-based technique, k-Medoids: A representative object based technique – Hierarchical Methods, Agglomerative versus diverse hierarchical clustering, Distance measures in algorithmic methods, BIRCH: multiphase hierarchical clustering using dynamic modeling, probabilistic clustering – Density-Based Methods: DBSCAN: Density-based clustering based on connected regions with high density, OPTICS: Ordering points to identify the clustering structure, DENCLUE: clustering based on density distribution functions – Grid-Based Methods: STING: statistical Information Grid – CLIQUE: An Apriori-like subspace clustering method.

Data Mining Applications: Data Mining for Financial Data Analysis - Data Mining for Retail and Telecommunication Industries - Data Mining in Science and Engineering - Data Mining for Intrusion Detection and Prevention - Data Mining and Recommender Systems.

Data Mining and Society: Ubiquitous and Invisible Data Mining – Privacy, Security, and Social Impacts of Data Mining – Data Mining Trends.

Data Analytics with R Programming : R Data Structures: Vectors, Scalars, Matrices, Arrays, Data Frames, List, R Data Objects, R Statements, Clustering, Classification, and Association Rule mining with RTool, Data Visualization.

Case Study:

- Derive the Association Rules for any market basket data set
- Using Naïve Bayes classification algorithm, classify a particular customer in a banking sector.
- Apply KMeans clustering algorithm and for smaple data set and analyze the clusters.
- Apply Visualization techniques for the above sated problems and infer the insights.

REFERENCE BOOKS:

1. Data Mining Concepts and Techniques – Jiawei Han, Micheline Kamber & Jain Pei, Morgan Kaufmann Publishers, Third edition 2012.
2. Usama M. Farrad, Geogory Piatetsky – Shapiro, padhrai Smyth and Ramasamy Uthurusamy, "Advances in Knowledge Discovery and Data Mining", The M.I.T. press.
3. Ralph Kimball, "The Data Warehouse Life Cycle Toolhit", John Wiley & Sons Inc.
4. Sean Kelly, "Data warehousing in Action", John Wiley & Sons Inc.
5. K.P. Soman."Shyam Diwakar, V. Ajay "Insights into data Mining", Theory and Practice, PHI Publications Eastern Economy Edition 6th Printing, 2012.
6. R Programming Fundamentals: Deal with data using various modeling techniques Paperback, by Kaelen Medeiros, September 27, 2018
7. Predictive Data Mining by lorose

Journals for Data Mining:

1. Data and Knowledge Engineering, ISSN: 0169 – 023X, Elsevier and Scopus Indexed.
2. IEEE Transactions on Knowledege and Data Engineering : Digital Library
3. ACM Transactions on Knowledge Discovery from Data **ISSN:**1556-4681, **EISSN:**1556-472X
4. KDD (Knowledge Discovery and Data Mining)Conference
5. International Journal of Science and Technology, ISSN (Print) : 0974-6846, ISSN (Online) : 0974-5645, Scopus Indexed Journal, Publisher: Indian Society for Education and Environment.
6. International Journal of Applied Engineering Research (IJAER), Print ISSN-0973-4562 , Online ISSN-1087-1090, Scopus Indexed, **Publisher:** Research India Publications.
7. KSII TRANSACTIONS ON INTERNET AND INFORMATION SYSTEMS, ISSN : 1976-7277, SCI, Publisher: Korea Society of Internet Information.
8. International Journal of Computer Engineering and Applications (IJCEA), ISSN 2321 – 3469, UGC Approved Journal.

9. International Journal of Computing Communications and Data Engineering Series (IADS), Elsevier, Scopus Indexed
10. Advances in Intelligent Systems and Computing, Source Type: Book series (AISC volume 1054), SPRINGER series, Publisher Name: Springer,Singapore, ISSN:21945357 Print ISBN: 978-981-15-0134-0, Online ISBN: 978-981-15-0135-7
11. International Journal of Recent Technology and Engineering UGC Approved and Elsevier and SCOPUS Indexed Journal (UGC CARE List Source Id:22773878, 206), ISSN: 2277 – 3878, Publisher: Blue Eyes Intelligence Engineering and Sciences Publication

Programme : M. Phil Computer Science **Part III : Elective**

Semester : I **Hours : 5 P/W 75 Hrs P/S**

Subject Code : MPSE1 **Credits : 5**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
1.	Introduction - Why Data Mining? - What is Data Mining?	2	Lecture
2.	What Kinds of Data Can Be Mined? - What Kinds of Patterns Can Be Mined? - Which Technologies Are Used? Which Kinds of Applications Are Targeted?	2	Lecture
3.	Major Issues in Data Mining. Getting to Know Your Data: Data Objects and Attribute Types.	2	Videos
4.	Data Objects and Attribute Types.	2	ICT (NPTEL Notes)
5.	Basic Statistical Description of Data, Measuring the Dispersion of Data.	2	Lecture
6.	Data Preprocessing: An Overview: Data Quality, Major tasks in Data preprocessing: Data Cleaning, Data Integration, Data Reduction , Data Transformation and Data Discretization.	3	Tutorial, ICT (Lecture Notes)
7.	Sample Data Collection and Analysis of Issues	1	Peer Teaching (Digital Library)
8.	Overview of Unit I	1	Group Discussion
UNIT 11			
9.	**Data Warehousing and Online Analytical Processing:** Basic Concepts: What is Data Warehouse, Differences between operational systems and Data Warehouses, But, why have a separate Data Warehouse?	3	Lecture
10.	Journal and Conference Papers related to the above discussion	2	Group Discussion (Digital Library)
11.	**Data Warehousing and Online Analytical Processing:** Data warehousing: A multitier architecture, Data Warehouse models: Enterprise Warehouse, Data Mart, and Virtual Warehouse, Extraction, Transformation, and loading, Metadata repository	3	ICT (NPTEL Notes)
12.	**Data Warehouse Modeling:** Data Cube	2	Lecture
13.	**Data Warehouse Modeling:** OLAP	1	Lecture
14.	Issues in Data Cube and OLAP	2	Peer Teaching

15.	Data Generalization by Attribute-Oriented Induction	1	Videos
16.	Discussion of UNIT II	1	Group Discussion
UNIT III			
17.	Mining Frequent Patterns	2	Lecture
18.	Associations, and Correlations	2	Lecture
19.	Basic Concepts and Methods	3	Videos
20.	Frequent Item set Mining Methods: Overview	2	Lecture
21.	Frequent Item set Mining Methods	3	ICT (NPTEL Notes)
22.	Which Pattern Are Interesting ? - Pattern Evaluation Methods.	1	Peer Teaching
23.	Journal and conference Papers, Exercise Problems	2	Discussion (Digital Library)
UNIT IV			
24.	Classification: Basic Concepts	1	Lecture
25.	Basic Concepts - Decision Tree Induction	1	Lecture
26.	Decision Tree Induction	2	ICT (NPTEL Notes)
27.	Exercise Problems	2	Tutorial
28.	Bayes Classification Methods	2	Lecture
29.	Bayesian Belief Networks	1	Video
30..	Classification by Back Propagation	2	ICT (Videos)
31.	Support Vector Machines	2	Lecture
32.	Journal and Conference Papers	2	Group Discussion (Digital Library)
UNIT V			
33.	Cluster Analysis Basic Concepts and Methods: Cluster Analysis	2	Lecture
34.	Partitioning Methods	2	Videos
35.	Hierarchical Methods	2	ICT (NPTEL Notes)
36.	Density Based Methods	2	Peer Teaching
37.	Grid Based Methods - Evaluation of Clustering.	1	Videos
38.	Outlier Detection	2	Lecture
39.	Data Mining Applications	1	Lecture
40.	Data Mining Applications: Domains	1	Group Discussion

41.	Data Mining and Society	1	Lecture
42.	Data Mining and Society	1	Videos

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	4	4	4	3	4	3	4	4	4	3.7
CO2	3	4	4	4	3	4	3	4	4	4	3.7
CO3	3	4	4	4	3	4	3	4	4	4	3.7
CO4	3	4	4	4	3	4	3	4	4	4	3.7
CO5	3	4	4	4	4	4	3	4	4	4	3.8
Mean Overall Score											3.72

Result: The Score for this Course is 3.72 (High Relationship)

COURSE DESIGNERS:

4. **Dr. G.SUJATHA**
Associate Professor, PG and Research Department of Computer Science.

5. **Dr. S. SUGUNA**
Assistant Professor, PG and Research Department of Computer Science

Programme : M. Phil Computer Science **Part III : Elective**

Semester : I **Hours : 5 P/W 75Hrs**

Sub. Code : MPSE2 **P/S**

Credits : 5

TITLE OF THE PAPER: DIGITAL IMAGE PROCESSING AND MACHINE VISION

Pedagogy	**Hours**	**Lecture**	**Peer Teaching**	**GD/VIDOES/TUTORIAL**	**ICT**
	5	**2**	**1**	**1**	**1**

PREAMBLE:

To enrich the knowledge about digital imaging system, digital image processing operations, image enhancement, image compression and image segmentation concepts.

COURSE OUTCOME At the end of the Semester, the Students will be able to		**Hrs P/S**
UNIT 1	**CO1:** Define and Recall the knowledge about image processing techniques and understand the concept of image analysis, storage formats of image	**15**
UNIT 2	**CO2:** Apply the attitude of image processing arithmetic operations and image transformation techniques.	**15**
UNIT 3	**CO3:** Explain the need for image enhancement and use of image restoration.	**15**
UNIT 4	**CO4:** Explain the concept of image compression models , measures and algorithms.	**15**
UNIT 5	**CO5:** What is the role of image segmentation , various Color models Color image transformation, and Image Morphology.	**15**

Programme : M. Phil Computer Science **Part III : Elective**

Semester : I **Hours : 5 P/W 75Hrs**

Sub. Code : MPSE2 **P/S**

Credits : 5

TITLE OF THE PAPER: DIGITAL IMAGE PROCESSING AND MACHINE VISION

UNIT I: Introduction to Image Processing

Overview of Image Processing - Nature of Image Processing - Digital Image Representation- Types of Images-Based on Nature - Based on Attributes - Based on Colour - Based on Dimensions-Based on Data Types - Domain Specific Images- Digital Image Processing Operations - Fundamental Steps In Image Processing - Image Enhancement - Image Restoration - Image Compression - Image Analysis and Synthesis.

Digital Imaging Systems: Overview of Digital Imaging Systems-Image Sensors-Image Storage-Image processors - Output Devices-Networking Components - Image Processing Software - Physical Aspects of Image Acquisition-Nature of Light-Simple Image Model - Colour Fundamentals -Lighting System Design-Simple Image Formation Process - Biological Aspects of Image Acquisition - Human Visual System - Properties of Human Visual System - Monochrome and Colour Image - Review of Digital Cameras-Sampling and Quantization - Sampling - Resampling - Image Quantization - Image Display Devices and Device Resolution - Digital Halftone Process - Random Dithering - Ordered Dithering - Non - periodic Dithering - Image Storage and File Formats - Need for File Formats -Types of File Formats - Structures of File Formats.

UNIT II: Digital Image Processing Operations

Basic Relationships and Distance Metrics - Image Coordinate System - Image Topology - Connectivity - Relations - Distance Measures - Important Image Characteristics - Classification of Image Processing Operations - Arithmetic Operations. Logical Operations - Geometrical Operations - Image Interpolation Techniques - Set Operations. **Digital Image Transforms:** Need for Image Transforms - Spatial Frequencies in Image Processing - Introduction to Fourier Transform - Discrete Fourier Transform - Fast Fourier Transform - Discrete Cosine Transform.

UNIT III: Image Enhancement

Image Quality Tool and Need for Image Enhancement - Image Quality Factors - Image Quality Assessment Toll - Image Quality Metrics - Image Enhancement operations - Image Enhancement in Spatial Domain - Linear Point Transformations - Non - Linear Transformations –Square Function - Square root - Logarithmic Function –Exponential Function - Power Function - Gamma Correction - Histogram - Based techniques - Histogram Stretching –Histogram Sliding - Histogram Equalization - Histogram Specification - Local and Adaptive Contrast Enhancement - Spatial Filtering Concepts - Image Smoothing Spatial Filters - Box Filters - Gaussian Filters - Image Sharpening Spatial Filters - Gradient and Laplacian Filters - High - boost Filters - Unsharp Masking.

Image Restoration: Introduction to Degradation - Types of Image Degradations - Image Degradation Model - Noise Modelling - Noise Categories Based on Distribution-
Noise Categories Based on Correlation - Noise Categories Based on Nature - Noise Categories Based on Source - Estimation by Observation - Estimation by Experimentation - Estimation by

Modeling - Image Restoration Techniques - Unconstrained Method - Inverse Filters - Wiener Filters.

UNIT IV: Image Compression

Image Compression Model - Compression - Measures - Compression Algorithm and its Types - Entropy Coding - Predictive Coding - Transform Coding - Layered Coding - Types of Redundancy - Coding Redundancy - Inter pixel Redundancy - Psychovisual Redundancy - Chromatic Redundancy - Lossless Compression Algorithms - Run - length Coding - Huffman Coding - Bit plane Coding - Arithmetic Coding - Dictionary - based Coding - Lossless Predictive Coding - Lossy Predictive Coding - Vector Quantization –Codebook design –Generalized Lloyd algorithm.

Wavelet Transform and Multi resolution Analysis: Wavelet Transforms - Haar Wavelet - Wavelet Series Expansion - Continuous Wavelet Transform - Discrete Wavelet Transform(DWT) - Faster Implementation of DWT - One dimensional DWT –Two dimensional DWT - Applications of Wavelet Transforms - Noise Filtering - Wavelet Image Compression - Embedded zero tree Wavelet Compression.

UNIT V: Image Segmentation

Introduction - Formal Definition of Image Segmentation-Classification of Image Segmentation Algorithms - Detection of Discontinuities –Point Detection-Line Detection - Edge Detection - Stages in Edge Detection - Types of Edge detectors - First order Edge Detection - Edge operator performance - Edge linking Algorithms - Principle of Thresholding - Principle of Region – growing.

Colour Image Processing - Introduction - Colour Image Storage and Processing - Colour Models - RGB Colour Model - HIS Colour Model - HSV Colour Model - HLS Colour Model - Printing Colour Models - Colour Quantization - Popularity or Populosity Algorithm - Median cut Algorithm - Octree based Algorithm - Pseudocolour Image Processing - Full colour Processing - Colour Transformatons - Image Filters for Colour Image - Colour image Segmentation.

Image Morphology: Need for Morphological Processing - Morphological Operators - Dilation Operation - Erosion operation - Approaches to dilation and Erosion Operations - Opening and Closing Operations - Hit or Miss Transform - Basic Morphological Algorithms - Bountary extraction - Noise Removal - Thinning - Thickening - Convex Hull - Skeletonization - distance Transform - Region filling Extraction of connected component - Pruning.

REFERENCE BOOKS:

1. Digital Image Processing, S.Sridhar, Second Edition, Oxford University Press 2016.
2. Digital Image Processing using MATLAB, Rafael C. Gonzalez, Richard E. Woods,2nd Edition, Prentice Hall of India, 2002.
3. Fundamentals of Digital Image Processing, A.Jain, Prentice Hall of India, 2010.
4. Digital Image Processing, Willliam K Pratt, John Willey, 2002.

Programme : M. Phil Computer Science **Part III : Elective**

Semester : I **Hours : 5 P/W 75Hrs P/S**

Sub. Code : MPSE2 **Credits : 5**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
	UNIT 1		
1.	Overview of image processing and image representation,	1	Lecture
2.	Fundamental steps in image processing, introduction to imaging systems, image analysis techniques	2	Lecture
3.	Sensors-Image Storage-Image processors - Output Devices-Networking Components - Image Processing Software	2	Videos
4.	Physical Aspects of Image Acquisition-Nature of Light-Simple Image Model,-Lighting System Design-Simple Image Formation Process	2	Tutorial
5.	Biological Aspects of Image Acquisition - Human Visual System - Properties of Human Visual System - Monochrome and Colour Image	2	Lecture
6.	Sampling - Resampling - Image Quantization - Image Display Devices and Device Resolution - Digital Halftone Process ,types of dithering	1	Lecture
7.	Working methodology of image analysis system using matlab	1	Peer Teaching
8.	Discuss about the overview of fundamental concept of digital image processing	2	Group discussion
9.	Image Enhancement and sampling, quantization	2	ICT (NPTEL notes)
	UNIT 11		
10.	Concepts of image coordinate system and relationships and distance metrics system	2	Lecture
11.	Classification of image processing operations	3	ICT (Videos)
12.	Image interpolation techniques	2	Lecture
13.	Concepts and need of digital image transformation	2	Tutorials
14.	Fourier Transform - Discrete Fourier Transform - Fast Fourier Transform - Discrete Cosine Transform	2	Lecture
15.	Applications of image transformation	2	Peer Teaching
16.	Journal Papers and Conference Papers	2	ICT (Digital Library)

UNIT III			
17.	Image Quality Factors - Image Quality Assessment Tool Image Quality Metrics - Image Enhancement operations - Image Enhancement in Spatial Domain	2	Lecture
18.	Difference between linear and non-linear transformation, Square Function - Square root - Logarithmic Function –Exponential Function - Power Function - Gamma Correction	2	Group Discussion (Digital Library)
19.	Histogram - Based techniques - Histogram Stretching –Histogram Sliding - Histogram Equalization - Histogram specification - Local and Adaptive Contrast Enhancement	2	ICT (NPTEL notes)
20.	Image Smoothing Spatial Filters - Box Filters - Gaussian Filters - Image Sharpening Spatial Filters - Gradient and Laplacian Filters -	2	Lecture
21.	High - boost Filters - Unsharp Masking.Concept of image restoration- Types of Image Degradations	2	Lecture
22.	Image Restoration Techniques - Unconstrained Method Inverse Filters - Wiener Filters, - Image Degradation Model - Noise Modeling	2	Tutorial
23.	Image Filter implementation using matlab	2	Peer Teaching
24.	Issues and Soutions	1	Group Discussion
25.	Application Areas	1	Group discussion
UNIT IV			
26.	Image Compression Model - Compression - Measures - Compression Algorithm and its Types	2	Lecture (Demo)
27.	Entropy Coding - Predictive Coding - Transform Coding - Layered Coding - Types of Redundancy -	2	Videos
28.	Coding Redundancy - Inter pixel Redundancy - Psycho visual Redundancy - Chromatic Redundancy	2	Lecture
29.	Basic Compression methods	1	Tutorial
30.	Lossless Compression Algorithms - Run - length Coding - Huffman Coding - Bit plane Coding - Arithmetic Coding	2	ICT (NPTEL Notes)
29.	Dictionary - based Coding - Lossless Predictive Coding	2	Videos
31.	Lossy Predictive Coding - Vector Quantization – Codebook design –Generalized Lloyd algorithm.	1	Lecture
32.	Application of compression techniques	1	Group Discussion
33.	Wavelet Transform and Multi resolution Analysis	1	Lecture

34.	Image compression implementation using Matlab	1	Peer Teaching
UNIT V			
35.	Fundamental concepts of Image Segmentation	1	Lecture
36.	Discuss about Classification of image Segmentation Algorithms	1	Lecture
37.	Detection of Discontinuities –Point Detection-Line Detection - Edge Detection - Stages in Edge Detection	1	ICT (Lecture Notes)
38.	Type of Edge Detectors- First order Edge Detection - Edge operator performance - Edge linking Algorithm	1	Lecture
39.	Concepts of image segmentation techniques- Thresholding - Principle of Region – growing.	1	Videos
40.	Introduction to colour image processing and colour image storage.	1	Lecture
41.	Various Colour models: RGB Colour Model - HIS Colour Model - HSV Colour Model - HLS Colour Model	1	Peer Teaching
42.	Printing Colour Models - Colour Quantization	1	Lecture
43.	Populosity Algorithm - Median cut Algorithm - Octree based Algorithm	1	Group Discussion
44.	Pseudocolour Image Processing - Full colour Processing	1	Peer Taching
45.	Colour Transformatons - Image Filters for Colour Image , Concept of Colour image Segmentation	2	ICT (NPTEL Notes)
46.	Image Morphology	1	Lecture
47.	Discuss about various image segmentation techniques	1	Videos
48.	Journal and Conference Papers related to this Unit	1	Group discussion

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	2	4	3	2	3	3	4	4	4	3	3.2
CO2	3	3	3	3	4	4	4	4	3	4	3.5
CO3	4	4	4	4	4	4	4	4	3	3	3.8
CO4	4	4	4	3	4	4	4	5	4	4	4
CO5	4	3	3	4	4	4	4	4	4	5	3.9
Mean Overall Score											3.68

Result: The Score for this Course is 3.68 (High Relationship)

COURSE DESIGNER: **Dr. M.SUMATHI**
Associate Professor / PG and Research Department of Computer Science.

Programme : M. Phil Computer Science **Part III : Elective**

Semester : I **Hours : 5 P/W 75Hrs**

Sub. Code : MPSE3 **P/S**

Credits : 5

TITLE OF THE PAPER: BIGDATA ANALYTICS

Pedagogy	**Hours**	**Lecture**	**Peer Teaching**	**GD/VIDOES/TUTORIAL**	**ICT**
	5	**2**	**1**	**1**	**1**

PREAMBLE:

To expose the knowledge in Big data , Data analytics and its implementation and Application.

COURSE OUTCOME At the end of the Semester, the Students will be able to		**Hrs P/S**
UNIT 1	**CO1:** Define the basics of Big Data , Types of Data and Data Warehouse Environment	**15**
UNIT 2	**CO2:** Explain the Data Analytics, Evolution ,Importance, Tools, Technology and Data Science.	**15**
UNIT 3	**CO3:** Make use of technologies and comparison of No Sql,RDMS, Hadoop ,and YARN	**15**
UNIT 4	**CO4:** Experiment with the working methodology of Map Reduce and Hive Query Language	**15**
UNIT 5	**CO5:** List the machine learning Algorithms using Python, MongoDB and R Programming, Case Study.	**15**

Programme : M. Phil Computer Science	**Part III : Elective**
Semester : I	**Hours : 5 P/W 75Hrs**
Sub. Code : MPSE3	**P/S**
	Credits : 5

TITLE OF THE PAPER: BIGDATA ANALYTICS

UNIT I: Introduction to Big Data: Types of Digital Data: Classification of Digital Data, Introduction to Big Data: Characteristics of data-Evolution of Big data-Challenges of Big data-Other Characteristics of Data Which are not Definitional Traits of Big Data-Why Big Data?-Are we Just an Information Consumer or Do we also produce Information?-Traditional Business Intelligence (BI) versus Big Data – A Typical Data Warehouse Environment – A Typical Hadoop Environment – What is New Today? – What is changing in the Realms of Big Data?

UNIT II: Analytics Basics:Big Data Analytics: Where do we Begin? – What is Big Data Analytics? – What Big Data Analytics Isn't? – Why this Sudden Hype Around Big Data Analytics? – Classification of Analytics – Greatest Challenges that Prevent Business from capitalizing on Big Data – Top Challenges Facing Big Data – why is Big Data Analytics Important? – What kind of Technologies are we looking Toward to Help Meet the Challenges Posed by Big Data? – Data Science – Data Scientist… Your New Best Friend – Terminologies Used in Big Data Environments – Basically available Soft State Eventual Consistency (BASE) – Few Top Analytics Tools.

UNIT III: Big Data Technologies:The Big Data Technology Landscape: NoSQL (Not Only SQL) – Hadoop, Introduction to Hadoop: Introducing Hadoop – Why Hadoop? – Why not RDBMS? – RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview – Use Case of Hadoop – Hadoop Distributors – HDFS(Hadoop Distributed File System) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN(Yet another Resource Negotiator) – Interacting with Hadoop Ecosystem.

UNIT IV: Introduction to MAPREDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression, Introduction to Hive: What is Hive? – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language (HQL) – RCFile Implementation – SerDe – User – Defined Function (UDF).

UNIT V: Analytical Algorithms: Introduction to Machine Learning – Machine Learning Algorithms.

Case Study:

- Data Analytics using Python
- Handling Big Data using MongoDB with R Programming

REFERENCE BOOK(S):

1. Big Data and Analytics, SeemeAcharya, and SubhashiniChellappan, Wiley India Pvt.Ltd. First Edition-2015.
2. Big Data – Principles and best practices of scalable real-time data systems, Nathan Marz, and James Warren, Manning Publication cp., USA-2015.
3. Analytics in a Big Data World: The Essential Guide to Data Science and its Applications, Bart Baesens, Wiley India Pvt.Ltd-2015.
4. Big Data, Data Mining and Machine Learning, Jared Deamn, Willey India Pvt.Ltd - 2015.
5. McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc.
6. Data Analytics with Python, 1st Edition by bharti Motwani, Publisher Wiley, 2020.
7. R Programming Fundamentals: Deal with data using various modeling techniques Paperback, by Kaelen Medeiros, September 27, 2018
8. https://docs.mongodb.com/manual/
9. Data and Knowledge Engineering, ISSN: 0169 – 023X, Elsevier and Scopus Indexed.
10. IEEE Transactions on Knowledege and Data Engineering : Digital Library
11. ACM Transactions on Knowledge Discovery from Data **ISSN:**1556-4681, **EISSN:**1556-472X

Programme : M. Phil Computer Science **Part III : Elective**

Semester : I **Hours : 5 P/W 75Hrs P/S**

Sub. Code : MPSE3 **Credits : 5**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
UNIT 1			
1.	Introduction to Big Data: Types of Digital Data: Classification of Digital Data, Introduction to Big Data:	2	Lecture
2.	Characteristics of data Evolution of Big data- Challenges of Big data-	2	Videos
3.	Other Characteristics of Data Which are not Definitional Traits of Big Data	1	Peer Teaching
4.	Why Big Data?-Are we Just an Information Consumer or Do we also produce Information?-Traditional Business Intelligence (BI) versus Big Data	2	Lecture
5.	A Typical Hadoop Environment – What is New Today? – What is changing in the Realms of Big Data?	2	Lecture
6.	A Typical Data Warehouse Environment	1	ICT (Google Class Room)
7.	Issues and Challenges in Current Trends	3	Group Discussion
8.	Problem Domains	2	Videos
UNIT 11			
8.	Analytics Basics: Big Data Analytics: Where do we Begin? – What is Big Data Analytics?	2	Lecture
9.	What Big Data Analytics Isn't? – Why this Sudden Hype Around Big Data Analytics?	2	ICT (PPT)
10.	Classification of Analytics – Greatest Challenges that Prevent Business from capitalizing on Big Data	2	Group Discussion
11.	Top Challenges Facing Big Data – why is Big Data Analytics Important? –	2	Lecture
12.	What kind of Technologies are we looking Toward to Help Meet the Challenges Posed by Big Data?	2	Peer Teaching
13.	Data Science – Data Scientist… Your New Best Friend – Terminologies Used in Big Data Environments –	1	Lecture
14.	Basically available Soft State Eventual Consistency (BASE) – Few Top Analytics Tools.	1	Lecture
15.	Implementing Analytical Tool : Issues and Solutions	2	Tutorial
	Journal and Conference Papers	1	Group Discussion
UNIT III			

16.	Big Data Technologies:The Big Data Technology Landscape: NoSQL (Not Only SQL)	2	Lecture
17.	Hadoop, Introduction to Hadoop: Introducing Hadoop – Why Hadoop? – Why not RDBMS	1	Peer Teaching
18.	RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview – Use Case of Hadoop	2	ICT (NPTEL Notes)
19.	Hadoop Distributors – HDFS(Hadoop Distributed File System) –	2	Tutorial
20.	Processing Data with Hadoop	2	Lecture
21.	Exercise Programs	1	Tutorial
22.	Managing Resources and Applications with Hadoop	1	Lecture
23.	YARN(Yet another Resource Negotiator)	1	Lecture
24.	Interacting with Hadoop Ecosystem	1	ICT (NPTEL Notes)
25.	Exercise Problems	2	Google Class Room
UNIT IV			
26.	Introduction to MAPREDUCE Programming: Introduction – Mapper – Reducer	2	Lecture
27.	Combiner – Partitioner – Searching – Sorting – Compression	3	Videos
28.	Introduction to Hive: What is Hive? – Hive Architecture – Hive Data Types	2	Lecture
29.	Hive File Format – Hive Query Language (HQL)	3	Tutorial
30.	RCFile Implementation – SerDe – User – Defined Function (UDF	2	Lecture
31.	Implementing the Program in R Tool	2	Videos
32.	Overview of unit IV	1	ICT(Slide show)
UNIT V			
33.	Analytical Algorithms	2	Lecture
34.	Machine Learning concepts	3	ICT (NPTEL Notes)
35.	Machine Learning Algorithms.	2	Lecture
36.	Application Areas	1	Group Discussion
37.	Association rule mining	1	Lecture
38.	Clustering and Classification Algorithms	1	Lecture
39.	Data Analytics using Python, MongoDB and R Programmins	3	ICT & Tutorial Session

40	Case Study: 1. Data Analytics using Python 2.Handling Big Data using MongoDB with R Programming	2	Group Discussion

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)					Mean scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO	
CO1	4	4	3	3	4	4	3	4	3	4	3.6
CO2	4	4	4	3	4	4	4	4	3	3	3.7
CO3	4	4	3	3	3	4	4	4	3	4	3.6
CO4	3	4	3	4	3	3	4	4	3	4	3.5
CO5	3	4	3	4	4	3	3	4	4	4	3.6
Mean Overall Score											3.6

Result: The Score for this Course is 3.6 (High Relationship)

COURSE DESIGNER:

1. **Dr. N. SUJATHA**
Assistant Professor / Department of Computer Science.

2. **Dr. A. PREMA**
Assistant Professor / Department of Computer Science.

Programme : M. Phil Computer Science **Part III : Elective**

Semester : I **Hours : 5 P/W 75 Hrs P/S**

Subject Code : MPSE4 **Credits : 5**

TITLE OF THE PAPER: WIRELESS SENSOR NETWORKS

Pedagogy	**Hours**	**Lecture**	**Peer Teaching**	**GD/VIDOES/TUTORIAL**	**ICT**
	5	**2**	**1**	**1**	**1**

PREAMBLE:

To enrich the knowledge about mobile communications, concepts of several media access scheme and different wireless communication systems.

COURSE OUTCOME At the end of the Semester, the Students will be able to		**Hrs P/S**
UNIT 1	**CO1:** Define Networked wireless sensor devices, design challenges and topology	**15**
UNIT 2	**CO2:** Explain the Localization, synchronization issues and approaches	**15**
UNIT 3	**CO3:** Organize the wireless characteristics, MAC protocols and contention free protocols	**15**
UNIT 4	**CO4:** Illustrate topology for connectivity, coverage and routing techniques.	**15**
UNIT 5	**CO5:** What do you mean by data centric routing and Reliability and congestion control.	**15**

Programme : M. Phil Computer Science	**Part III : Elective**
Semester : I	**Hours : 5/W 75 Hrs/S**
Subject Code : MPSE4	**Credits : 5**

TITLE OF THE PAPER: WIRELESS SENSOR NETWORKS

UNIT I : Introduction and Network Deployment

Introduction: the vision, Networked wireless sensor devices, Applications, Key design challenges. **Network deployment:** Structured versus randomized deployment, Network topology, Connectivity, Connectivity using power control, Coverage metrics, Mobile deployment.

UNIT II: Localization and Synchronization

Localization: issues & approaches, Coarse-grained & Fine-grained node localization, Network-wide localization, Theoretical analysis of localization techniques. **Synchronization:** Issues & Traditional approaches, Fine-grained clock synchronization, and Coarse-grained data synchronization.

UNIT III: Wireless characteristics and Medium-access and sleep scheduling

Wireless characteristics: Basics, Wireless link quality, Radio energy considerations, SINR capture model for interference. **Medium-access and sleep scheduling:** Traditional MAC protocols, Energy efficiency in MAC protocols, Asynchronous sleep techniques, Sleep-scheduled techniques, and Contention-free protocols.

UNIT IV: Sleep-based topology control and Routing

Sleep-based topology control: Constructing topologies for connectivity, constructing topologies for coverage, Set K-cover algorithms. **Routing:** Metric-based approaches, Routing with diversity, Multi-path routing, Lifetime-maximizing energy-aware routing techniques, Geographic routing, Routing to mobile sinks.

UNIT V: Data-centric networking, Reliability and congestion control

Data-centric networking: Data-centric routing, Data-gathering with compression, Querying, Data-centric storage and retrieval, The database perspective on sensor networks. **Reliability and congestion control:** Basic mechanisms and tunable parameters, Reliability guarantees, Congestion Control, Real-time scheduling.

REFERENCE BOOKS:

1. Wireless Sensor Networks: Technology, KazemSohraby, Daniel Minoli, TaiebZnati , Protocols, and Applications, Wiley Inter Science, 2007.
2. Wireless Sensor Networks: Architectures and Protocols Edgar H. Callaway, Jr. Auerbach Publications, CRC Press, 2003.
3. Wireless Sensor Networks: Edited by C.S Raghavendra, Krishna M, Sivalingam, TaiebZnati , Springer, 2005.
4. Networking Wireless Sensors, Bhaskar Krismachari, , Cambridge University Press, 2005.

5. Distributed Sensor Networks: A Multiagent Perspective, Victor Lesser, Charles L. Ortiz, and MilindTambe, , Kluwer Publications, 2003.
6. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas , Morgan Kaufmann Series in Networking, 2004.

REFERENCE JOURNALS

1. https://www.springeropen.com/collections/WSN
2. https://www.mdpi.com/journal/sensors/sections/sensornetworks
3. https://www.hindawi.com/journals
4. https://m.scirp.org/journal/wsn
5. https://ieee-sensor

Programme : M. Phil Computer Science **Part III : Elective**

Semester : I **Hours : 5 P/W 75 Hrs P/S**

Subject Code : MPSE4 **Credits : 4**

UNITS	TOPIC	LECTURE HOURS	MODE OF TEACHING
	UNIT I		
1.	Introduction: the vision, Networked wireless sensor devices	2	Lecture
2.	Applications, Key design challenges.	2	Lecture
3.	Network deployment: Structured versus randomized deployment, Network topology	2	Videos
4.	Introduction Connectivity using power control.	2	ICT (NPTEL Notes)
5.	Coverage metrics, Mobile deployment.	2	Lecture
6.	Introduction: the vision, Networked wireless sensor devices	3	Tutorial, ICT (Lecture Notes)
7.	Applications, Key design challenges.	1	Peer Teaching (Digital Library)
8.	Overview of Unit I	1	Group Discussion
	UNIT II		
9.	Localization: issues & approaches	3	Lecture
10.	Coarse-grained & Fine-grained node localization,	2	Group Discussion (Digital Library)
11.	Network - wide localization,	3	ICT (NPTEL Notes)
12.	Theoretical analysis of localization techniques.	2	Lecture
13.	Synchronization: Issues & Traditional approaches	1	Lecture
14.	Fine-grained clock synchronization,	2	Peer Teaching
15.	Coarse-grained data synchronization	1	Videos
16.	Discussion of UNIT II	1	Group Discussion
	UNIT III		
17.	Wireless characteristics: Basics, Wireless link quality.	2	Lecture
18.	Radio energy considerations, SINR capture model for interference.	2	Lecture
19.	Medium-access and sleep scheduling: Traditional MAC protocols	3	Videos

20.	Energy efficiency in MAC protocols, Asynchronous sleep techniques	2	Lecture
21.	Sleep - scheduled techniques	3	ICT (NPTEL Notes)
22.	Application	1	Peer Teaching
23.	Contention-free protocols	2	Discussion (Digital Library)
UNIT IV			
24.	Sleep-based topology control	1	Lecture
25.	Constructing topologies for connectivity, constructing topologies for coverage	1	Lecture
26.	Set K-cover algorithms.	2	ICT (NPTEL Notes)
27.	Routing: Metric-based approaches	2	Tutorial
28.	Routing with diversity	2	Lecture
29.	Multi-path routing	1	Video
30..	Lifetime-maximizing energy-aware routing techniques	2	ICT (Videos)
31.	Geographic routing, routing to mobile sinks	2	Lecture
32.	Journal and Conference Papers	2	Group Discussion (Digital Library)
UNIT V			
33.	Data-centric networking: Data-centric routing	2	Lecture
34.	Data-gathering with compression	2	Videos
35.	Querying, Data-centric storage and retrieval	2	ICT (NPTEL Notes)
36.	Database perspective on sensor networks.	2	Peer Teaching
37.	Reliability and congestion control: Basic mechanisms and tunable parameters	1	Videos
38.	Reliability guarantees	1	Lecture
39.	Congestion Control	1	Lecture
40.	Real-time scheduling	2	Lecture
41.	Journal and Conference Papers	1	Group Discussion
42.	Data centric routing and storage	1	Videos

Course Outcomes (Cos)	Programme Outcomes (Pos)					Programme Specific Outcomes (PSOs)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	4	4	3	4	3	4	4	3	3.5
CO2	4	4	4	4	3	4	3	4	4	4	3.8
CO3	3	4	4	4	3	4	3	4	3	4	3.6
CO4	3	4	4	4	3	4	4	4	4	4	3.8
CO5	3	4	4	4	4	4	3	4	4	4	3.8
Mean Overall Score											3.70

Result: The Score for this Course is 3.70 (High Relationship)

COURSE DESIGNER:

1. **Dr. P.PUNITHA PONMALAR**

Associate Professor, PG and Research Department of Computer Science.