PSGR
Krishnammal College for Women

College of Excellence, nirf 2023-4th Rank
Autonomous and Affiliated to Bharathiar University
Reaccredited with A++ grade by NAAC, An ISO 9001: 2015 Certified Institution
Peelamedu, Coimbatore-641004

DEPARTMENT OF COMPUTER SCIENCE (PG)

CHOICE BASED CREDIT SYSTEM (CBCS) & LEARNING OUTCOME BASED CURRICULAR FRAMEWORK (LOCF)

MASTER OF SCIENCE (COMPUTER SCIENCE)
2023 - 2025 BATCH

(Semester I, II)

M.Sc Computer Science

Programme Outcomes

After completion of the programme, the student will be able to

PO1: Demonstrate broad knowledge in core areas of computer science, current and emerging technologies in IT

PO2: Apply higher degree of technical skills in problem solving and application development

PO3: Gain analytical and managerial skills to enhance employment potential

PO4: Acquire holistic development with strong emphasis on values and ethics

Programme Specific Outcomes

The students at the time of graduation will

PSO1: Identify and formulate complex problems to achieve solutions using concepts of algorithms, advanced networks, database management systems, artificial intelligence and machine learning

PSO2: Design solutions for complex problems and design processes that meet the specific needs of the society.

PSO3: Create and apply appropriate techniques, resources and tools including prediction and modeling to multifaceted activities

PSO4: Apply programming and technical skills to solve real life complex problems and hence enhance employability

PSO5: Analyse research methods including interpretation of data and synthesis of the information to provide valid conclusions.

PSO6: Demonstrate skills as an individual and as a member or leader in diverse teams

PSO7: Recognize the need for life-long learning and pursue career as a researcher or software engineer.

PSO8: Apply ethical principles and contribute effectively to the welfare of the society

Programme &Branch: M.Sc. Computer Science
Curriculum and Scheme of Examination (2023 - 2025 Batch onwards)
Semester I, II

Semester	Part	Subject Code	Title of Paper	Instruction hours/week	Contact hours	Tutorial hours	Duration of Examination	Examination Marks			Credits
								CIA	ESE	Total	
I	III	MCS2301	Paper 1: Design and Analysis of Algorithms	4	58	2	3	25	75	100	4
I	III	MCS2302	Paper 2 : Network Security	4	58	2	3	25	75	100	4
I	III	MCS2303	Paper 3: Modern Operating Systems	4	58	2	3	25	75	100	4
I	III	MCS2304	Paper 4 : Data Mining Techniques and Tools	4	58	2	3	25	75	100	4
I	III	MCS2305	Paper 5 : Digital Image Processing	4	58	2	3	25	75	100	4
I	III	MCS23P1	Lab 1 : Data Mining Techniques and Tools Lab	5	75	-	3	25	75	100	3
I	III	MCS23P2	Lab 2: Full Stack Development Lab	5	75	-	3	25	75	100	3
I	III		Online course	-	-	-	-	-	-	-	-
II / III	III	MCS23CE	Paper 6: Python Programming**	3	45	-	-	100	-	100	3
		MCS2306	Paper 6 /10: Artificial Intelligence	3	43	2	3	25	75	100	3
II	III	MCS2307	Paper 7: Internet of Things	5	73	2	3	25	75	100	5
II	III	MCS2308	Paper 8: Software Process Management	4	58	2	3	25	75	100	4
II	III	MCS23E1/ MCS23E2/	Elective – I Machine Learning / Internet Protocol /	4	58	2	3	25	75	100	4

		MCS23E5/ MCS23E8	Information Retrieval / Soft Computing								
II	III	MCS23P3	Lab3: ADBMS Lab	5	75	-	3	25	75	100	3
II	III	MCS23P4	Lab4: Big Data Analytics Lab	5	75	-	3	25	75	100	3
II	III	MTH19A5	Interdisciplinary Course: Statistical Techniques in Practice	4	60	-	3	-	100	100	4
II	III		Online Course	-	-	-	-	-	-		-

**** Coursera**

List of Electives

S. No.	Course Code	Course Title
1	MCS23E1	Machine Learning
2	MCS23E2	Internet Protocol
3	MCS23E3	Deep Learning
4	MCS23E4	Cyber Security and Forensics
5	MCS23E5	Information Retrieval
6	MCS23E6	Natural Language Processing
7	MCS23E7	Social Media Analytics
8	MCS23E8	Soft Computing
9	MCS23E9	Virtual Reality

Semester I

MCS2301	DESIGN AND ANALYSIS OF ALGORITHMS	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course covers the fundamental techniques for designing and analyzing algorithms, including asymptotic analysis, Trees, graphs, divide and conquer algorithms and recurrences. It also presents effective search methods, graph algorithms and randomized algorithms

Prerequisite

- Data structures and algorithms

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the performance of algorithms using analysis techniques.	**K2**
CLO2	Apply appropriate algorithms and data structures for various applications.	**K3**
CLO3	Analyze the computational complexity of various and estimate their worst-case and average-case behavior.	**K4**
CLO4	Evaluate the analysis of algorithm efficiency using different notations.	**K5**
CLO5	Design, implement, and evaluate an algorithm to meet desired needs.	**K6**

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	M	S	S
CLO2	S	S	S	M
CLO3	S	S	M	S
CLO4	M	S	S	S
CLO5	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(11 Hrs)**

Basic concepts in Algorithmic Analysis: Introduction- Historical Background - **Binary Search- Merging Two Sorted -Selection Sort - Insertion Sort**-Bottom-up Merge Sorting- **Time Complexity- Space Complexity**- How to Estimate the Running Time of an Algorithm Worst-Case and Average-**Case Analysis- Amortized Analysis.**

UNIT II **(11 Hrs)**

Data Structures: Introduction- **Linked Lists- Trees- Binary Trees**. Heaps data structures: Introduction- Heaps- Divide and Conquer: Introduction- Binary Search-**Merge sort-** The Divide-and-Conquer Paradigm- Selection: Finding the Median and the kth Smallest- **Quick sort.**

UNIT III **(12 Hrs)**

AVL trees: Definition – Height – searching – insertion and deletion of elements-**AVL rotations – Analysis.** Red black trees: Definition – searching – **insertion and deletion of elements** – Algorithms and their time complexities. Splay trees: Definition – **Steps in Splaying** – Analysis -Multi-way search trees: Indexed Sequential Access – m-way search trees – B-Tree – searching, **insertion and deletion - B trees**.

UNIT IV **(12 Hrs)**

Dynamic Programming: Introduction- The Longest Common Subsequence Problem- The Dynamic Programming Paradigm- The All-Pairs Shortest Path Problem- **Travelling sales Person problem** -The Knapsack Problem**.** Greedy Approach: Introduction- The Shortest Path Problem- **Minimum Cost Spanning Trees (Kruskal's Algorithm)- Minimum Cost Spanning Trees (Prim's Algorithm)**

UNIT V **(12 Hrs)**

Graph Traversal: Introduction-Depth First search-**Applications of DFS**-Breadth-First search-**Applications of BFS**-Complexity of Problems: NP-complete Problems: - Introduction-The Class P-The Class NP-**NP-complete Problems**.Backtracking: Introduction-**The 8-Queens Problem- Sum of Subset Problem – Graph Coloring – Hamiltonian Cycles.**

Text Books

M. H. Alsuwaiyel (2016), "Algorithms Design Techniques and Analysis", Revised Edition, World Scientific Publishing Co. Pvt. Ltd.

Reference Books

1. Ellis Horowitz, Sartaj Sahni and SanguthevarRajasekaran (2019). Fundamentals of Computer Algorithms, 2/e, Universities Press Private Limited, India.
2. Priya Sen, "Design and Analysis of Algorithm" (2017), Tutorial Point(I) Pvt. Ltd.

Pedagogy: Lectures, Group Discussions, Case studies

Course Designers

1. Dr. S. Poongodi
2. Dr. S. Sasikala

MCS2302	NETWORK SECURITY	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course presents the fundamental concepts of cryptography and network security. It focuses on web security, IP security and system security. It also deals with the practical applications of network security.

Prerequisite

- Number Theory
- Computer Networks

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basics of Cryptography and Network Security	K2
CLO2	Apply Cryptography Theories, Algorithms and Techniques to Build Protection Mechanisms	K3
CLO3	Analyze Cryptographic methods and algorithms for a secure storage and movement of data	K4
CLO4	Evaluate the security of the in-built cryptosystems and threats in network security	K5
CLO5	Develop cryptographic algorithms and authentication schemes for information security and authorization.	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	S	M	M
CLO2	S	S	M	S
CLO3	S	S	M	S
CLO4	S	S	S	S
CLO5	S	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I (11 Hrs)

Computer and Network Security Concepts: Computer Security Concepts, **OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms,** Fundamental Security Design Principles, Attack Surfaces and Attack Trees, Model for Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, **Steganography**.

UNIT II (11 Hrs)

Block Ciphers and the DES: Traditional Block Cipher Structure, DES, DES Example**, Strength of DES, Block Cipher Design Principles**. Random Bit Generation and Stream Ciphers: Principles of Pseudorandom Number Generation, Pseudorandom Number Generation Using a Block Cipher, **Stream Ciphers**, RC4. Public Key cryptography and RSA: Principles of Public–Key Cryptosystems, RSA Algorithm.

UNIT III **(12 Hrs)**

Other Public–Key Cryptosystems: Diffie-Hellman Key exchange, Elliptic Curve Cryptography. **Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Secure Hash Algorithm (SHA).** Message Authentication Codes: Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs.

UNIT IV **(12 Hrs)**

Digital Signatures: Introduction, Elgamal and Schnorr Digital Signature Scheme. Transport-Level Security: Web Security Considerations, Transport Layer Security, HTTPS, Secure Shell (SSH). **Electronic Mail Security: Internet Mail Architecture, Email Formats, S/MIME, Pretty Good Privacy**

UNIT V **(12 Hrs)**

IP Security: Overview, Policy, Encapsulating Security Payload. Intruders: Intruders, Intrusion Detection, Password Management. Malicious Software: Types, Viruses, Virus Countermeasures, Distributed Denial of Service Attacks. **Firewalls: The Need for Firewalls, Firewall Characteristics, Types of Firewalls.**

Text Book

William Stallings (2017). Cryptography and Network Security - Principles and Practices, Seventh Edition, Pearson India Education.

Reference Books

1. AtulKahate (2019). Cryptography and Network Security, 4E,McGraw-Hill
2. BruiceSchneier (2008). Applied Cryptography – Principles, Algorithm and Source in C, 2/e, Wiley India Pvt. Ltd, New Delhi.

Pedagogy: Lectures, Demonstrations, Case Studies

Course Designers

1. Dr. R. Kowsalya
2. Dr. M. Sasikala

MCS2303	MODERN OPERATING SYSTEMS	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course introduces the architecture of various modern operating systems. It also includes the techniques such as virtualization, scheduling, memory management and distributed system. The course provides case studies in Linux and Android.

Prerequisite

- Operating System
- Data Structure

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of distributed operating system.	K2
CLO2	Apply the concepts of distributed operating system in various models	K3
CLO3	Analyze the controlling access techniques in distributed operating system in various environments	K4
CLO4	Evaluate file system structure tools used in modern operating systems	K5
CLO5	Perform administrative tasks on Linux Servers and compare iOS and Android Operating Systems.	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	M	M	S
CLO2	S	S	M	M
CLO3	S	M	M	S
CLO4	M	S	L	S
CLO5	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I (11 Hrs)

Distributed Systems – Network Hardware - Network Services and Protocols-Document Based Middleware – File system based middleware - Object based middleware- Co-ordination based middleware – **Multi computers: User level Communication software** – Remote Procedure call -Distributed shared memory – Multicomputer scheduling – Load Balancing.

UNIT II (11Hrs)

Processes and Threads: Process model- Process Creation-Process Termination-Process Hierarchies-Process State. **Threads**: Thread usage -Classical Thread Model-Implementing Threads in userspace and kernel. Interprocess communication-semaphores- Message Passing-**Scheduling-Scheduling in Batch systems-Interactive Systems- Real time Systems-Thread scheduling.**

UNIT III **(12 Hrs)**

Security Environment: Threats – Attackers - Controlling Access to Resources - Protection Domains - Access control lists – Capabilities - Formal Models of Secure Systems - Multilevel security – Covert Channels - Authentication using a Physical object - Authentication using Biometrics – **Defenses – Code signing – Jailing – Model based intrusion detection – encapsulating mobile code**

UNIT IV **(12 Hrs)**

Case Study : Linux Overview – Processes in Linux : Process Management system calls in Linux – Implementation of processes and threads – Scheduling – Memory Management System calls- Paging – **Input –output system calls - Linux file system: Fundamental concepts – File system calls in Linux**

UNIT V **(12 Hrs)**

Case Study**:** Android and Google - History of Android - Design Goals - Android Architecture - Linux Extensions – Dalvik - Binder IPC – Android Applications - Intents – Security - Process Model. Mobile OS - iOS and **Android - Architecture and SDK Framework,** Media Layer, Services Layer, Core OS Layer, File System.

Text Book

1. Andrew S. Tanenbaum Herbert Bos (2015). Modern Operating Systems, 4/e, Pearson Education.

Reference Books

1. Andrew S.Tanenbaum (2011). MaartenVan Steen, Distributed System – Principles and Paradigms, 2/e, Prentice Hall of India Pvt. Ltd.
2. Shubra Garg(2013). Fundamentals of Distributed Operating Systems, S.K. Kataria& Sons, 2013.
3. YakupPaker et al (2012). Distributed Operating Systems: Theory and Practice, Springer.
4. S SKudate A P Kale et al(2012). Distributed Operating Systems, NiraliPrakashan.
5. Andrew S.Tanenbaum (2011). Distributed Operating System, 10/e, Pearson Education.
6. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, ―Operating System Concepts‖, 9th Edition, John Wiley and Sons Inc., 2012.
7. Daniel P Bovet and Marco Cesati, ―Understanding the Linux kernel‖, 3rd edition, O'Reilly, 2005.
8. Neil Smyth, ―iPhone iOS 4 Development Essentials – Xcode‖, Fourth Edition, Payload media, 2011.

Pedagogy : Lectures, Demonstrations, Group Discussions

Course Designers:

1. Dr. S. Sasikala
2. Dr. R. Kowsalya

MCS2304	DATA MINING TECHNIQUES AND TOOLS	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course presents the basic concepts of data mining and various data mining techniques like classification, clustering, association rule mining. The course also introduces various applications of data mining such as text mining, web mining, multimedia mining, image mining, spatial mining and data visualization.

Prerequisite

- Database Management Systems
- Probability and Statistics

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand data mining techniques, algorithms and data visualization	K2
CLO2	Apply data mining techniques to carry out simple data mining tasks	K3
CLO3	Analyze data mining algorithms appropriate for different data mining applications	K4
CLO4	Evaluate data mining models for solving real world problems	K5
CLO5	Develop predictive models using advanced data mining techniques for various application domains	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	S	M	L
CLO2	S	S	M	L
CLO3	S	S	M	L
CLO4	S	S	M	L
CLO5	S	S	M	L

S- Strong; M-Medium; L-Low

Syllabus

UNITI (11 Hrs)

Introduction: Need for data mining - Kinds of data - Patterns for mining: Characterization and Discrimination Associations - Classification and Regression - Cluster Analysis - Outlier Analysis - **Technologies - Applications - Major issues in Data Mining.** Data Preprocessing: Overview - Data cleaning - Data integration - Data reduction - Data Transformation and Discretization.

UNIT II **(12Hrs)**

Association rule mining : Apriori algorithm, Mining Frequent Patterns–Associations and correlations – Mining Methods– Mining Various kinds of Association Rules– Correlation Analysis– **Constraint based Association mining. Graph Pattern Mining, SPM.**

UNIT III **(12Hrs)**

Classification - Decision trees - Support Vector Machine - K Nearest neighbor - Bayesian classification- NaiveBayes, Rule–based classification, Lazy learner. Clustering: Cluster Analysis - Partitioning Methods: K-Means, K-Medoids - Hierarchical Methods: BIRCH, Probabilistic Hierarchical clustering - **Density based methods: DBSCAN, OPTICS**

UNIT IV **(12Hrs)**

Advanced Concepts: Basic concepts in Mining data streams–Mining Time–series data—Mining sequence patterns in Transactional databases– Mining Object– Spatial– Multimedia–Text and Web data – Spatial Data mining– Multimedia Data mining–Text Mining– Mining the World Wide Web.

Data Visualization: Foundations for building visualizations - Visualizing data -Working with Data in Tableau - Moving from Foundational to Advanced Visualizations.

UNIT V **(11Hrs)**

Data Mining Trends and Research Frontiers: Mining Sequence data: Time-series, Symbolic sequences and Biological sequences Mining graphs and networks Visual and audio data mining. **Data mining applications: Financial data analysis Retail and telecommunication-Science and engineering Intrusion detection Recommender systems.**

Text Books

1. Jaiwei Han, MichelineKamber (2012). Data Mining-concepts and techniques, 3/e, Morgan Kaufmann Publishers, San Francisco.
2. Joshua N.Milligan (2017). Learning Tableau, PACKT publishing.
3. Data Mining Introductory and Advanced topics – Margaret H Dunham, PEA

Reference Books

1. Jaiwei Han, MichelineKamber (2022). Data Mining-concepts and techniques, 4/e, Morgan Kaufmann Publishers, San Francisco.
2. Mark A. Hall, Ian H. Witten, Eibe Frank (2011). Data Mining: Practical Machine Learning Tools and Techniques, 4/e, Morgan Kaufmann Publishers, San Francisco
3 David Hand, HeikkiMannila and Padhraic Smyth (2001). Principles of Data Mining, Prentice Hall of India, New Delhi.
4. Arun K. Pujari (2001). Data Mining Techniques; Universities Press, Hyderabad
5 Soman KP (2005). Data mining from theory to practice, 2/e, PHI Learning Pvt. Ltd., New Delhi.

Pedagogy: Lectures, Group Discussions, Case studies

Course Designers

1. Dr. R. Kowsalya
2. Dr. S. Poongodi

MCS2305	DIGITAL IMAGE PROCESSING	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course covers the fundamental techniques to expose simple image enhancement techniques, image segmentation and representation techniques with image compression and recognition methods

Prerequisite

- Basic Mathematics, Programming Skills

Course Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.	K2
CLO2	Apply appropriate methods on images using the techniques of smoothing, sharpening and enhancement	K3
CLO3	Analyze the restoration concepts and filtering techniques.	K4
CLO4	Evaluate the basics of segmentation, features extraction, compression and recognition methods for color models	K5
CLO5	Design and implement image compression recognition methods	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	M	S	S	S
CLO2	M	S	S	M
CLO3	S	M	S	S
CLO4	S	M	S	S
CLO5	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I (11 Hrs)

Digital Image Fundamentals Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - Color image fundamentals - **RGB**, HSI models, Two-dimensional mathematical preliminaries, **2D transforms**.

UNIT II (11 Hrs)

Image Enhancement Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters **- Homomorphic filtering - Color image enhancement.**

UNIT III **(12 Hrs)**

Image segmentation Edge detection, Edge linking via Hough transform – Thresholding - Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, **Segmentation by morphological watersheds** – basic concepts – **Dam construction – Watershed segmentation algorithm**

UNIT IV **(12 Hrs)**

Image compression and Recognition Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture - **Patterns and Pattern classes - Recognition based on matching.**

UNIT V **(12 Hrs)**

Image Restoration - degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – **Inverse Filtering – Wiener filtering.**

Text Books

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing ‘, Pearson, Third Edition,2010.
2. Anil K. Jain, Fundamentals of Digital Image Processing ‘, Pearson, 2002

Reference Books

1. Kenneth R. Castleman, Digital Image Processing ‘, Pearson, 2006.
2. Rafael C Gonzalez, Richard E. Woods, Steven Eddings, Digital Image Processing using MATLAB ‘, Pearson Education, Inc., 2011.

Pedagogy

Lectures, Group Discussions, Case studies

Course Designers

1. Dr. S. Lakshmi Priya
2. Dr. S. Sasikala

MCS23P1	DATA MINING TECHNIQUES AND TOOLS LAB	Category	L	T	P	Credit
		III	-	-	75	3

Preamble

This course provides exercises to implement data mining techniques such as classification, clustering, association rule mining, and regression using data mining tools like R, Python. This course also includes exercise to visualize the data using Tableau and PowerBI.

Prerequisite

- SQL, Oracle

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Implement the association rule mining, classification, clustering, prediction algorithm and implement data visualization using Tableau and PowerBI.	K3
CLO2	Apply data mining techniques to real world problem	K3
CLO3	Analyze the performance of various classification, clustering and prediction algorithm.	K4
CLO4	Evaluate the features of data mining tools.	K5
CLO5	Build models using classification, clustering and prediction to solve real world problems using Python.	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	S	S	M
CLO2	S	S	S	M
CLO3	S	S	S	M
CLO4	S	S	S	M
CLO5	S	S	S	M

S- Strong; M-Medium; L-Low

Syllabus

- Exercises to implement visualization techniques in R
- Exercises to implement correlation, linear regression in R
- Exercises to perform classification in R
- Exercises to perform clustering using Python
- Exercises to perform association rules using Python
- Exercises to perform text mining using Python
- Exercise to perform visualization using Tableau

- Exercise to perform visualization using PowerBI

Pedagogy: Demonstrations

Course Designers
1. Dr. S. Poongodi
2.Dr. M. Sasikala

MCS23P2	FULL STACK DEVELOPMENT LAB	Category	L	T	P	Credit
		III	-	-	75	4

Preamble

This course provides exercises to create dynamic web application in both client and server side using CSS3, AJAX, Javascript, jQuery, PHP/ MySQL, Angular and ReactJS. It enables students to equip themselves as a full stack developer.

Prerequisite

HTML

Course Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of Client side /Server side web programming	K2
CLO2	Implement validation concepts using jQuery and angular JS	K3
CLO3	Analyze the requirements to implement the principles of web page development	K4
CLO4	Design applications using connectivity with MySQL database	K5
CLO5	Develop dynamic web pages using client side and server side scripting	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	S	S	M
CLO2	M	S	S	M
CLO3	M	S	S	M
CLO4	M	S	S	M
CLO5	M	S	S	M

S- Strong; M-Medium; L-Low

Syllabus

- Exercise to pass information between web pages using GET and POST methods.
- Exercise to apply string functions to manipulate strings.
- Exercise to implement file operations.
- Exercise to implement the date and time functions.
- Exercise to create menus, styles, Animation using CSS using AJAX

- Exercise to manipulating JSP and SQL.
- Exercise to validate the HTML form fields using Javascript object,scope and Events.
- Exercise using jQuery and CSS.
- Exercise to handle events and special effects using jQuery and jQuery Traversing.
- Exercise to implement explode and implode functions
- Exercise to create data base connectivity using PHP and MySQL
- Exercise using Angular
- Exercise using ReactJS.

Pedagogy: Demonstrations

Course Designers

1. Dr. R. Kowsalya
2.Dr. S. Lakshmi Priya

Semester II

MCS23CE	PYTHON PROGRAMMING	Category	L	T	P	Credit
		III	45	-	-	3

Preamble

This course introduces the core concepts of programming in Python. It also provides knowledge in concepts like regular expressions, text processing, multithreading, internet programming, GUI programming and database programming. It also explores Web Development using Python.

Prerequisite

- Basic concepts of Programming Language
- Database concepts

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the programming constructs of Python	K2
CLO2	Apply the concepts of Python in simple tasks	K3
CLO3	Analyze python packages suitable to develop solutions for real time problems	K4
CLO4	Evaluate the complex problems and solve using python modules	K5
CLO5	Create python projects for real time applications	K6

Mapping with Program Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	S	M	M
CLO2	S	S	S	M
CLO3	S	S	M	M
CLO4	S	S	S	M
CLO5	S	S	S	M

S- Strong; M-Medium; L-Low

Sl.No.	Coursera Courses	Coursera Link	No. of Hours
1	Crash Course on Python	https://www.coursera.org/programs/psgr-faculty-learning- program-1luew/skills/python-programming-language?collectionId=skill~python-programming-language&productId=8D3R5HiaEeioIg7r4jw_PA&productType=course&showMiniModal=true	22
2	Capstone: Retrieving Processing, and Visualizing Data with Python	https://www.coursera.org/programs/psgr-faculty-learning-program-1luew/learn/python-data-visualization?specialization=python	9
3	Using Python to Access Web Data	https://www.coursera.org/programs/psgr-faculty-learning-program-1luew/learn/python-network-data?specialization=python	14

MCS2306	ARTIFICIAL INTELLIGENCE (SEMESTER II / III)	Category	L	T	P	Credit
		III	43	2	-	3

Preamble

This course introduces the concepts of Artificial Intelligence and the various methods of solving problems using Artificial Intelligence. It also provides insights on machine learning techniques and its applications.

Prerequisite

Probability and Statistics
Discrete Structures

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the techniques of knowledge representation and problem solving in the field of artificial intelligence	K2
CLO2	Apply appropriate AI techniques for real time scenarios	K3
CLO3	Analyze suitable Artificial Intelligence principles to solve a given problem	K4
CLO4	Evaluate different AI algorithms appropriate for solving a given problem	K5
CLO5	Design and develop models for predictive tasks in various domains	K6

Mapping with Program Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	S	M	M
CLO2	M	M	M	M
CLO3	M	M	M	M
CLO4	S	M	M	M
CLO5	S	S	M	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(9 hrs)**

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth- First, DepthFirst Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

UNIT II **(9 hrs)**

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning. Randomized Search: Genetic Algorithm - Ant Colony Optimization.

Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT III **(9 hrs)**

Knowledge representation issues: Representations and mappings – Approaches to Knowledge representations – Issues in Knowledge representations – Frame Problem.

Using Predicate Logic: Representing simple facts in logic – Representing Instance and Is a relationship – Computable functions and predicates – Resolution

UNIT IV **(8 hrs)**

Representing knowledge using rules: Procedural Vs Declarative knowledge – Logic programming – Forward Vs Backward reasoning – Matching – Control knowledge

UNIT V **(8 hrs)**

Expert Systems: Representing and Using Domain Knowledge- Expert Knowledge Shell- Knowledge Acquisition- Perception. **Case Studies:** AI in Environmental Management (Smart Pollution Control, Water Management, Farming) - AI in Retail (Alibaba, Walmart) - AI in Medical Imaging (MRI, US, Mammography)

Reference Books

1.Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Publishing, 2020, Fourth edition.

2.G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education

3.Lavika Goel," Artificial intelligence: Concepts and applications", First edition, Wiley Publications

Pedagogy: Lectures, Demonstrations, Case Studies

Course Designers:

1. Dr. R. Kowsalya
2. Ms. A. Sheela Rini

MCS2307	INTERNET OF THINGS	Category	L	T	P	Credit
		III	73	2	-	5

Preamble

This course aims to cover the basics of Internet of Things and protocols, Internet evolving to connect people to physical things and also physical things to other physical things all in real It helps us to learn about the middleware for Internet of Things

Prerequisite

Basic knowledge of hardware and networking technology for IoT projects**.**

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basics of Internet of things and protocols	**K2**
CLO2	Implementing IoT architecture and IoT design constraints	**K3**
CLO3	Analyze the basics of IOT protocols and M2M	**K4**
CLO4	Evaluate the low-cost embedded system using IoT	**K5**
CLO5	Designing IoT solutions using sensors, actuators and Devices in Arduino or Raspberry Pi	**K6**

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	M	S	M	S
CLO2	S	M	M	M
CLO3	S	S	S	M
CLO4	S	M	M	S
CLO5	M	S	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(15 hrs)**

Introduction to Internet of Things: Elements of an IoT - Technology drivers, Business drivers, Trends and implications, Machine-to-Machine Communications. Characteristics IoT – Physical Design of IoT - Logical Design of IoT- Functional Blocks - IoT Communication Models and APIs - IoT enabled Technologies- M2M and WSN – Cloud Computing. IoT and M2M: M2M -**Difference between IoT and M2M - Software defined networks- Network functions virtualization**. Communication Protocols– Issues with IoT Standardization – Unified Data Standards. IoT system Management and its protocol:

Needs for IoT Management – Simple Network Management Protocol (SNMP) - Limitations of SNMP – Network operation Requirements – IoT system with NETCONF-YANG. Application Protocols for IoT: UPnP, CoAP, MQTT, XMPP, DDS, AMQP SCADA, WebSocket; IP-based protocols: 6LoWPAN, RPL, Authentication Protocols.

UNIT II **(15 hrs)**

Architecture for IoT: Domain model specification, Information Model Specification, Service specification, IoT Level specification, Functional view specification, Operational view specification, Device and Component Integration, User centered design, Open-source development, End user programming, Tools for IoT. IoT Platform Design Methodology: Design Methods - Connectivity Technologies (6L) 6LoWPAN- **RFID- Zigbee Bluetooth- NFC-Piconets.** M2M value chains- IoT value chains – Emerging Industrial structure of IoT. Network & Communication aspects in IoT: Wireless Medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

UNIT III **(15 hrs)**

Devices a Gateway: Device types – Deployment scenarios for devices-Gateways – Data management – Local Application – Device Management – Need of Networks (LAN / WAN) - Advanced Devices- IoT analytics – Analytical architecture – Methodology – Knowledge management – Reference model of IoT and architecture – IoT reference model – IoT domain model – Information model - Functional model – Communication model – Security and Privacy. Introduction to Arduino: Structuring an Arduino Program- Simple Primitive Types- Floating-Point Numbers –Working with groups of values- Arduino String Functionality – C character Strings- Converting Number to String – Structuring the Code into Function Block- **Serial communication - Input from Sensor - Input from visual output- Audio Output.**

UNIT IV **(14 hrs)**

Introduction on Raspberry Pi: About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python. IoT Design using Raspberry Pi: IoT Applications based on Pi- , LAMP Web-server- GPIO Control over Web Browser- Creating Custom Web Page for LAMP- Communicating data using on-board module- Home automation using Pi -Node-RED-MQTT Protocol, Using Node-RED Visual Editor on Rpi Configuring- Wi-Fi on Raspberry Pi-MQTT (Message Queuing Telemetry Transport) protocol-**Establishing communication between IoT devices- Analyzing and processing IoT data on Raspberry Pi-Implementing security measures for IoT devices.**

UNIT V **(14 hrs)**

Introduction to Cloud Storage Models: Overview of cloud-based IoT platforms- Cloud Deployment Models-**Cloud service Models: PaaS, SaaS, IaaS**- IoT Platform- Cloud IoT Architecture-IoT cloud services- Comparison of Google, AWS and Azure IoT Core Services- AWS IoT Core -Connecting a web application to AWS IoT using MQTT-. Security Concerns, Risk Issues, and Legal Aspects of Cloud Computing- **Cloud Data Security.** Data analytics for IoT: MapReduce Programming model, Ozie workflow for IoT data analysis, Setting up a Strong, Cluster, REST - based approach, Web Socket - based approach. **Broad categories of IoT applications: Consumer IoT, Commercial IoT, Industrial IoT, Infrastructure IoT, Military Things (IoMT). Case Study: Automotive Applications, home automation, smart cards**

Text Books

1. Arshdeep Bahga and Vijay Madisetti Internet of Things - A Hands-on Approach, Universities Press, 2015, ISBN: 9788173719547

2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press,2014
3. Monika Mangla, Suneeta Satpathy, Bhagirathi Nayak, Sachi Nandan Mohanty” Integration of Cloud Computing with Internet of Things: Foundations, Analytics, and Applications”, 2021 Scrivener Publishing LLC

Reference Books

1. Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat “Industrial Internet of Things: Cyber manufacturing Systems” (Springer), 2017.
2. Zaigham Mahmood, “The Internet of Things in the Industrial Sector: Security and Device connectivity, smart environments and Industry 4.0 (Springer), 2019.
3. Bassi, Alessandro, et al, “Enabling things to talk”, Springer-Verlag Berlin An, 2016.
4. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, “IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, CISCO Press, 2017
5. Olivier Hersent,David Boswarthick, Omar Elloumi“The Internet of Things key applications and protocols”, willey

Pedagogy: Lectures, Group Discussions, Case studies

Course Designers

1. Dr. S. Lakshmi Priya
2. Dr. R. Kowsalya

MCS2308	SOFTWARE PROCESS MANAGEMENT	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course presents the concepts of software product life cycle models, and Agile project management using Scrum and Lean. The course also introduces DevOps tools and technologies.

Prerequisite

- Software Engineering

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand Agile Methodologies and DevOps tools	K2
CLO2	Apply software process management concepts in real-time applications	K3
CLO3	Analyze various Agile Methodologies.	K4
CLO4	Evaluate the various software models which suitable for real-time application.	K5
CLO5	Design a plan for delivering a quality product	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1.	S	S	S	M
CLO2.	S	S	S	M
CLO3.	S	S	S	M
CLO4.	S	S	S	M
CLO5.	S	S	S	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(12 Hrs.)**

Foundations: Background – The Software Process Ecosystem – Historical Overview – Terminology and Basic Concepts. Software Process in the Software Product Life Cycle: Introduction – **Basic Software Development Life Cycle Models** – Methodology – **Driven Cycle and Process Models – Detailed combined Software Life Cycle and Process Models**

UNIT II **(12 Hrs.)**

Agile: Introduction – Core Attitudes of Agile – Learning through Example - The need for Agile Methodologies – Principles of Agile Project Management – Introduction to Scrum – Scrum Principles – **Sprint Planning, Execution and Reviewing – Becoming a better Scrum Master - Introduction to kanban – The work in progress.**

UNIT III **(12 Hrs.)**

Scrum: Agile Principles and Values - Scrum: Development Teams, Scrum Master, Planning, Sprint Review, Sprint Retrospective - Three Scrum Artifacts – Sprint Cycle – **Scrum Estimation – Scrum Planning and Roadmaps – The daily Scrum –Scrum case studies.**

UNIT IV **(11 Hrs.)**

DevOps Concepts, Tools, and Technologies: Understanding the DevOps movement - The DevOps lifecycle - Tools and technologies: Code Repositories – **GIT, Build Tools – Maven, Continuous Integration Tools – Jenkins, Configuration Management tools** – Chef, Container Technology – Docker – Monitoring Tools - Installing and Configuring Docker.

UNIT V **(11 Hrs.)**

Introduction to Lean - Lean Thinking Tools - Design Thinking, Lean and Agile: Introduction – Actionable Strategy – Act to Learn – Leading teams to win- **Delivery: DevOps and Continuous Delivery – Evolutionary Architecture and Emergent Design.**

Reference Books

1. Ralf Kneuper (2018), Software Processes and Life Cycle Models , Springer. (Unit – I)
2. James Edge, Agile(2018) – An Essential Guide to Agile Project Management, The Kanban Process and Lean Thinking, CreateSpace Independent Publishing. (Unit – II & III)
3. Mitesh Soni(2016), Devops for Web Development, , Packt Publishing. (Unit – IV)
4. Jonny Schneider(2017), Understanding Design thinking, Lean and Agile,O'Reilly Publishing. (Unit – V)

Pedagogy: Lectures, Demonstrations, Case Studies

Course Designers:

3. Dr. R. Kowsalya
4. Ms. A. Sheela Rini

MCS23P3	ADBMS LAB	Category	L	T	P	Credit
		III	-	-	75	3

Preamble

This course provides implementation of object oriented, parallel and partitioning concepts in RDBMS packages. This course also covers various queries in advanced databases like Neo4j and MongoDB

Prerequisite

- RDBMS
- SQL
- Oracle & MS-Access

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of integrity constraints with some example Queries	K2
CLO2	Implementing object oriented, parallel and partitioning queries and queries in MongoDB	K3
CLO3	Analyze the concepts of different databases	K4
CLO4	Design simple applications using VB with MS-ACCESS, Oracle and SQL	K5
CLO5	Develop real time applications using advanced databases like Graph Databases	K6

Mapping with Programme Outcomes

Cos	PO1	PO2	PO3	PO4
CO1.	S	M	M	M
CO2.	S	M	M	M
CO3.	S	S	M	M
CO4.	S	M	S	M
CO5.	S	S	S	M

S- Strong; M-Medium; L-Low

Syllabus

- Exercises to implement DDL and DML Commands.
- Exercises to implement the concepts of null constraint, unique constraint, integrity constraints,check constraints.

- Exercises to implement parallel queries.
- Exercises to implement the concepts of partitioning queries.
- Exercises to implement object-oriented concepts.
- Exercises to implement the various queries for CRUD operations in MongoDB.
- Exercises to implement Replication, Backup and Restore of database in MongoDB.
- Exercises to implement aggregate functions in MongoDB.
- Exercises to implement the various queries for CRUD operations in Neo4j.
- Exercises to implement various clauses like order by, read, write and where clause in neo4j.
- Exercises to implement string functions in neo4j.
- Exercises to implement aggregate functions in neo4j.
- Develop a simple application using ADODC with front end as VB and MS-ACCESS as back-end.
- Develop a simple application using ADODC with front-end as VB and Oracle as back-end.
- Develop a simple application using ADODC with front-end as VB and SQL. as back-endconnectivity.

Pedagogy: Demonstrations

Course Designers

1. Mrs.A.Sheela Rini
2. Dr. M. Sasikala

List of Exercises:

1. Create an employee table and perform Insertion, updation, deletion and set the following constraints.
    a) Primary
    b) Foreign Key
    c) Check
    d) Unique
    e) Null
2. Create an employee table and perform following join operation.
    a) Self join
    b) Inner join
    c) Outer join
    d) Left join
    e) Right join
3. a) Create sales table with (sid, sname, sale_amount, sale_date) perform range partition with sales_date for (January February, March).
    b) list and hash partitioning.
4. a) Create table employee (empno, dept, salary) and another table emp2 using the parallel query concepts.
5. Create a type address (street, city, state) as object and create table employee using the same type. Insert values and update the address of an employee.
6. Develop an application for Banking Management system using VB and My SQL.
7. Write queries in MongoDB to create student collection with id ,name, course, percentage. Create

another collection student2 with id, age, gender, address

a) Display all students coming from Coimbatore.
b) Display all students getting above 50 percent.
c) Display all female students coming from Erode.
d) Display all bsc students in descending order of their percentage.

8. Write queries in MongoDB to perform CRUD Operations:

a) Insert a sample of 5 users into the database with various profile details. Then, retrieve users with usernames starting with 'A'.

b) Update the email address of a specific user. Ensure that the change is reflected in the database.

c) Identify and delete users who have not logged in for more than six months.

9. Write queries in MongoDB to perform Querying and Filtering:

a) Retrieve products with a price between $50 and $100 in the "Electronics" category.
b) Retrieve posts created within the last 30 days and sort them by the creation date.

10. Write queries in MongoDB to perform Aggregation:

a) Calculate the average rating of products based on customer reviews using the aggregation framework.
b) Find the top 5 posts with the highest number of comments using the aggregation framework.

11. Write queries in MongoDB to create a student database

a) Create a backup of student database
b) Restore student database from the backup.

12. Write basic Cypher queries in Neo4j for creating Node and Relationship:

a) Create two nodes representing users with properties like name and email.
b) Establish a friendship relationship between two users. Create a relationship type like FRIEND_OF.
c) Create nodes representing different cities with properties like name and population. Connect the users to the cities with a relationship type indicating their current residence.

13. Write basic Cypher queries in Neo4j for Retrieving Data Using MATCH, WHERE, and RETURN clauses.

a) To retrieve all nodes of a specific label (e.g., User). Return the names and email addresses of these users.
b) Retrieve the friendship relationships (FRIEND_OF) between users. Return the names of the users who are friends.
c) To find users who live in a specific city. Use the MATCH and WHERE clauses.

14. Create a node student with properties such as name, department, score and grade. use ORDER BY clause to perform the following:

a) order nodes by using properties
b) order nodes by using multiple properties
c) order nodes in descending order.

15. Write queries in Neo4j to Update and Delete nodes.

a) Update the email address of a specific user.
b) Delete a friendship relationship between two users.

16. Implement where clause for library database to filter the node label, node relationship and node properties in neo4j.

MCS23P4	BIG DATA ANALYTICS LAB	Category	L	T	P	Credit
		III	-	-	75	3

Preamble

This course provides sound introduction to implement the Hadoop framework and also various exercises to implement in the distributed environment through map reduce programming. This course provides implementation of the Hadoop components like Pig and Spark.

Prerequisite

Big data framework

Course Learning Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand Hadoop components for big data processing and building a Hadoop cluster.	**K2**
CLO2	Apply simple processing operations in Pig.	**K3**
CLO3	Analyze simple processing operations in Spark and Scala.	**K4**
CLO4	Explore specific Mapper and reducer functions for different situations	**K5**
CLO5	Develop Spark, Hive, Cassandra and Zepplin for data processing	**K6**

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	S	M	M
CLO2	S	S	M	M
CLO3	S	S	M	M
CLO4	S	S	S	M
CLO5	S	S	S	M

S- Strong, M-Medium, L-Low

Syllabus

1.Setting up a Hadoop environment
2.Exercises to implement file management tasks using Hadoop
3.Exercises to implement Map Reduce program that mines patient data
4.Exercises to implement Pig Latin scripts to sort, group, join, project, and filter data.
5.Exercises to implement simple processing tasks in Spark & Scala.
6.Exercises to implement basic operations in Spark SQL.
7.Exercise to implement Spark RDD actions.
8.Exercise to implement Hive, Cassandra and Zepplin.

List of Exercises:

1. Implement the following file management tasks in Hadoop: Adding files and directories, retrieving files, Deleting Files.
2. Write a simple YARN client Application. Develop a Map Reduce program to calculate the frequency of a given word in given file.
3. Develop a Map Reduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year.
4. Develop a Map Reduce to analyze weather data set and print whether the day is shiny or cool day.
5. Write a Pig script to find the Count of Gender and Hobbies.
6. Write a program to find the number of words using Pig Script.
7. Write a Program to Creation, Alter, and Dropping Internal and External tables in Hive
8. Write a Program to implement Tables, Partitions, and Buckets in Hive.
9. Implement Built-in Functions in Hive for employee and student details.
10. Write a Hive Program to perform four types of join operations for customer table.
11. Write a Scala program that creates a class Employee with properties like name, age, and designation. Implement a method to display employee details.
12. Write a Scala program to test if a given string contains the specified sequence of char values.
13. Write a Scala program to create a map and find the minimum and maximum values in the map.
14. Write a Scala program to create Data frame and perform group by Operations with Summer Olympic data.
15. Write a program to create and use a key space in Cassandra using Java API.
16. Write a program to add a column to an existing table in Cassandra using Java API.
17. Write a Scala program to find the count of words in a document using Spark RDD.
18. Analyse the Cyber Crime Data set and display the results in charts using Zeppelin.
19. Develop an online using Interactive Queries and prepare Charts using Zeppelin.

Pedagogy: Demonstrations

Course Designers

1. Dr. S. Poongodi
2. Dr. M. Sasikala

ELECTIVES

MCS23E1	MACHINE LEARNING	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course introduces the fundamentals of Machine Learning and its algorithms. It also covers various supervised and unsupervised learning algorithms for classification, prediction and clustering.

Prerequisite

- Linear Algebra
- Data Mining

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand supervised, unsupervised and semi-supervised learning	K2
CLO2	Apply supervised and unsupervised learning algorithms for classification, prediction and clustering	K3
CLO3	Analyze the efficiency of machine learning algorithms suitable for applications.	K4
CLO4	Evaluate various machine learning models.	K5
CLO5	Design an appropriate model for any given application	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	M	S	M	M
CLO2	S	M	S	M
CLO3	S	M	S	M
CLO4	S	S	M	S
CLO5	S	M	S	S

S- Strong; M-Medium; L-Low.

Syllabus

UNIT I **(11 Hrs.)**

Introduction: Machine learning Basics – **Examples of machine Learning Applications.** Supervised Learning: Learning a class from Examples - Vapnik- Chervonenkis Dimension - Probably Approximately Correct Learning – Noise - Learning Multiple Classes – Regression - **Model Selection and Generalization** - Dimensions of a Supervised Machine Learning Algorithm.

UNIT II **(12 Hrs.)**

Bayesian Decision Theory: Classification - Losses and Risks - Discriminant Functions - Association Rules. Parametric Methods: Maximum Likelihood Estimation - Evaluating an Estimator: Bias and Variance - The Bayes' Estimator - Parametric Classification – Regression - **Tuning Model Complexity: Bias/Variance Dilemma - Model Selection Procedures.**

UNIT III **(12 Hrs.)**

Multivariate Methods: Multivariate Data - Parameter Estimation - Estimation of Missing Values - Multivariate Normal Distribution - Multivariate Classification - Tuning Complexity - Discrete Features - Multivariate Regression. Nonparametric Methods: Nonparametric Density Estimation - Generalization to Multivariate Data - **Nonparametric Classification - Condensed Nearest Neighbor - Distance-Based Classification - Outlier Detection - Nonparametric Regression: Smoothing Models.**

UNIT IV **(12 Hrs.)**

Decision Trees: Univariate Trees – Pruning - Rule Extraction from Trees - **Learning Rules from Data** - **Multivariate Trees**. Clustering: Mixture Densities - k-Means Clustering - Expectation-Maximization Algorithm - Mixtures of Latent Variable Models - Supervised Learning after Clustering - Spectral Clustering - Hierarchical Clustering - **Choosing the Number of Clusters.**

UNIT V **(11 Hrs.)**

Multilayer Perceptrons: Introduction – Perceptron - Training a Perceptron - **Learning Boolean Functions - Multilayer Perceptrons** - MLP as a Universal Approximator - Backpropagation Algorithm - Training Procedures - **Tuning the Network Size** - Bayesian View of Learning - Dimensionality Reduction - Learning Time. **WEKA Implementations.**

Text Book:

Ethem Alpaydm, "Introduction to Machine Learning", PHI Learning Pvt. Ltd.; Third edition, 2015

Reference Books:

1. Ian Witten, Data mining: Practical Machine Learning Tools and Techniques, Fourth edition, Morgan Kaufmann Publishers, 2016
2. Tom M. Mitchell (1997). Machine Learning, Tata McGraw-Hill, New Delhi

Pedagogy:

Lectures, Group Discussions, Demonstrations.

Course Designers:

1.Dr. M. Sasikala
2.Dr. S. Poongodi

MCS23E2	INTERNET PROTOCOLS	Category	L	T	P	Credits
		III	58	2	-	4

Preamble

This course presents the concept of protocols in the TCP/IP suite (IP, UDP & TCP), Layering Concepts, and Routing Architectures. It also includes Internet Addressing, Mobile IP Addressing, Network Virtualization and Client Server model of interaction.

Prerequisite

- Computer Networks
- Basic Concept of Networking

Course Outcomes

On successful completion of the course, the students will be able to,

CLO Number	CLO Statement	Knowledge Level
CO1	Understand the concept of protocols in the TCP/IP suite, protocol Layering, Routing Architecture.	K2
CO2	Apply TCP/IP in the Mobiles.	K3
CO3	Analyze the relation between the various internet protocols.	K4
CO4	Evaluate the suitability of an internet protocol for supporting a given application type.	K5
CO5	Construct the alternate protocol.	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CO1	S	M	M	S
CO2	S	M	M	S
CO3	S	S	S	S
CO4	S	S	S	S
CO5	S	S	S	S

S – Strong; M – Medium; L - Low

Syllabus

UNIT I **(11 Hrs)**

Introduction and Overview: The TCP/IP Internet – Internet services – History and Scope of the Internet –Internet Architecture Board - Transition to IPv6 - Relationship between IPv4 and IPv6 - IPv6 Migration, Overview of Underlying Network Technologies: Two Approaches to Network Communication – WAN and LAN – Ethernet – Wi-Fi - ZigBee – OC and POS - Bridging – Congestion and Packet Loss, Internetworking Concept and Architectural Model: **Application Level Interconnection – Network Level Interconnection – Internet Architecture – Interconnection of Multiple Networks with IP Routers**, Protocol Layering: Reference Model - **ISO 7 Layer - TCP/IP 5 Layer.**

UNIT II **(11 Hrs)**

Internet Addressing: IPv4 - Classful Addressing Scheme - Subnet Addressing - Classless Addressing Scheme - Classless Addressing Example - IPv6 Addressing Scheme - Embedding IPv4 Addresses In IPv6 For Transition - Special Addresses - Weaknesses In Internet Addressing, Mapping Internet Addresses of Physical Addresses (ARP), Internet Protocol: Connectionless Datagram Delivery: **Connectionless Delivery System Characteristics – IP Datagram – Datagram Encapsulation – Fragmentation – Reassembly**.

UNIT III **(12 Hrs)**

Internet protocol: Forwarding IP Datagrams, Error and Control Messages: Internet Control Message Protocol - Error Reporting Vs. Error Correction - ICMP Message Delivery - ICMP Message Format – Example ICMP Message Types Used with IPv4 & IPv6, User Datagram Protocol, Reliable Stream Transport Service (TCP): Properties of the Reliable Delivery Service – **Sliding Window Paradigm - Transmission Control Protocol - Layering, Ports, Connections, and Endpoints - Segment Format - Checksum Computation**.

UNIT IV **(12 Hrs)**

Routing Architecture: Origin of Forwarding Tables - Forwarding With Partial Information - Internet Architecture and Cores – Distance Vector (Bellman-Ford) Routing – Link State (SPF) Routing, Routing Among Autonomous Systems : Scope Of A Routing Update Protocol - Autonomous System Concept - Exterior Gateway Protocols And Reachability – BGP, Routing Within an Autonomous System : **Static Vs. Dynamic Interior Routes - Routing Information Protocol (RIP) - Open SPF Protocol (OSPF) - IS-IS Route Propagation Protocol**.

UNIT V **(12 Hrs)**

Mobility And Mobile IP : Mobility, Addressing, and Routing - Mobility Via Host Address Change - Mobility Via Changes In Datagram Forwarding - Mobile IP Technology - Mobile IP Operation - Mobile IPv4 Addressing - IPv6 Mobility Support - Datagram Transmission, Reception, and Tunnelling - Assessment Of IP Mobility And Unsolved Problems , Network Virtualization: Virtual Private Networks (VPNs) - VPN tunnelling and IP-in-IP Encapsulation- **VPN Addressing And Forwarding - Network Address Translation (NAT) - Example Of NAT Translation - Overlay Networks - Multiple Simultaneous Overlays, Client-Server Model of Interaction.**

Text Book

Douglas E.Comer (2014), Internetworking with TCP/IP Vol I: Principles, Protocols and Architecture, 6/e, New Delhi, Pearson Publications.

Reference Books

1. Behrouz A.Forouzan (2006), TCP/IP protocol Suite 1, Tata McGraw Hill, New Delhi.
2. Richard Stevens (2003), TCP/IP Illustrated Volume 2, Prentice Hall of India, New Delhi.
3. Julie C. Gaffin (2007) Internet Protocol 6, Nova Science Publisher Inc., Newyork.

Pedagogy

Lectures, Case Studies, Group Discussions.

Course Designers

1.Mrs.A. Sheela Rini
2.Dr. M.Sasikala

MCS23E3	DEEP LEARNING	Category	L	T	P	Credits
		III	58	2	-	4

Preamble

This course covers the context of deep learning, know how to use a neural network, understand the data needs of deep learning, have a working knowledge of deep learning, and explore the parameters for deep learning

Prerequisite

- Artificial Intelligence
- Machine Learning

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basics of deep learning	**K2**
CLO2	Apply the concept of optimization and generalization in deep learning.	**K3**
CLO3	Explore the deep learning applications.	**K4**
CLO4	Evaluate the analysis of algorithm efficiency using different notations.	**K5**
CLO5	Implement various deep learning models.	**K6**

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	M	S	S
CLO2	S	S	S	M
CLO3	S	S	M	S
CLO4	M	S	S	S
CLO5	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(11 Hrs.)**

Introduction to Machine learning: Linear models (SVMs and Perceptions and logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates.

UNIT II **(11 hrs.)**

History of Deep Learning: A Probabilistic Theory of Deep Learning- Back propagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks, Convolution Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning.

UNIT III **(12 Hrs.)**

Linear (PCA, LDA) and manifolds, metric learning: Auto encoders and dimensionality reduction in networks - Introduction to Convent - Architectures – Alex Net, VGG, Inception, Res Net - Training a Convent: weights initialization, batch normalization, hyper parameter optimization.

UNIT IV **(12 Hrs.)**

Optimization in deep learning: Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience.

UNIT V **(12 Hrs.)**

Applications of Deep Learning: Images segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative adversarial networks – Video to Text with LSTM models – Attention models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

Text Books

Ian Goodfellow, YoshuaBengio, Aaron Courville, (2017) Deep Learning, MIT Press.

Reference Books

1. Francois Chollet, “Deep Learning with Python”, Manning Publications, 2018
2. Phil Kim, “Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence”, Apress, 2017.

Pedagogy: Lectures, Group Discussions, Case studies

Course Designers

1. Dr. M. Sasikala
2. Dr. S. Poongodi

MCS23E4	CYBER SECURITY AND FORENSICS	Category	L	T	P	Credits
		III	58	2	-	4

Preamble

This course covers the fundamental techniques security aspects like threats, attacks and authentication procedures. It also presents effective security systems and investigate security incidents.

Prerequisite

- Computer Security

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of various security aspects like threats, attacks and authentication procedures	K2
CLO2	Apply various type security attacks by inspecting their characteristics.	K3
CLO3	Analyze security issues in network and computer systems	K4
CLO4	Evaluate and communicate the human role in security systems	K5
CLO5	Interpret and forensically investigate security incidents	K6

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	M	S	S
CLO2	S	S	S	M
CLO3	S	S	M	S
CLO4	M	S	S	S
CLO5	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(11 Hrs.)**

Introduction to Cybercrime: Cybercrime and Information Security - Classifications of Cybercrimes – Legal Perspectives of Cybercrimes - Indian Perspectives of Cybercrimes –Cybercrime and the Indian ITA 2000 – Global Perspective on Cybercrimes. Cyber offenses: Categories of Cybercrime – **How Criminal Plan the Attacks** – **Social Engineering** – **Cyberstalking** – **Cybercafé and cybercrimes- Botnets**.

UNIT II **(11 Hrs.)**

Cybercrime in Mobile and Wireless Devices: Introduction – proliferation of Mobile and Wireless Devices – Trends in mobility – C**redit card Frauds in Mobile and Wireless Computing Era** – Security Challenges posed by Mobile Devices – Registry settings for Mobile Devices –Authentication Service Security – **Attacks on Mobile/Cell Phones** – Mobile Devices Security Implications for Organizations – Organizational Measures for Handling Mobile Devices – Organizational Security Policies and Measures in Mobile Computing Era. Phishing and Identity Theft: – Introduction – Phishing – **Identity Theft.**

UNIT III **(12 Hrs.)**

Cyber Crime and Cyber Laws: Cybercrime and the legal landscape around the World – Need for Cyber Laws – Indian IT Act – **Challenges in Indian law and Cybercrime Scenario in India – Consequences of Not Addressing the weakness in IT Act -** Digital Signatures and the Indian IT Act – Amendments to the Indian IT Act – Cybercrime and Punishment.

UNIT IV **(12 Hrs.)**

Understanding Computer Forensics: Historical Background – Need for Computer Forensics – Cyber forensics and Digital Evidence – Forensics Analysis of Email – Digital Forensics Life Cycle- Chain of Custody Concept – Network forensics – Approaching a Computer Forensics Investigation – **Forensics and Social Networking Sites** – **Computer forensics from Compliance perspectives- Challenges in Computer Forensics.**

UNIT V **(12 Hrs.)**

Digital Forensics: Overview - Preparing for Digital Investigations – Maintaining Professional Conduct – Preparing a Digital Forensics Investigation – Procedures for Private Sector High Tech Investigations – **Understanding Data Recovery Workstations and Software – Conducting an Investigation.** Data Acquisition: Understanding Storage Formats for Digital Evidence – Determining the Best Acquisition Method – Contingency planning for Image Acquisitions - Using Acquisition Tools – **Validating Data Acquisitions – Using Other Forensics Acquisitions Tools.**

Text Books

1. Nina Godbole and Sunit Bela pore; "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley Publications,2011.
2. Bill Nelson, Amelia Phillips and Christopher Steuart; "Guide to Computer Forensics and Investigations" – 6th Edition, Cengage, 2019

Reference Books

1. LNJN National Institute of Criminology and Forensic Science, "A Forensic Guide for Crime Investigators – Standard Operating Procedures", LNJNNICFS, 2016.
2. Harlan Carvey; "Windows Forensic Analysis Toolkit", Syngress, 2012.

Pedagogy: Lectures, Group Discussions, Case studies

Course Designers

1. Dr. M. Sasikala
2. Dr. S. Poongodi

MCS23E5	INFORMATION RETRIEVAL	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course presents the concepts of document representation, document indexing, digital information storage, retrieval and distribution. It also introduces effective search strategies for IR systems, vector space model, text classification and evaluation methods of IR systems.

Prerequisite

- Database Management systems
- Data mining

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of document representation, document indexing, digital information storage, retrieval and distribution	**K2**
CLO2	Apply the concepts of vector spaces and classifiers to perform document classification.	**K3**
CLO3	Examine the advantages and disadvantages of different information retrieval models.	**K4**
CLO4	Determine the effective search strategies for IR systems	**K5**
CLO5	Able to develop information retrieval system for specific use cases.	**K6**

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	M	M	M
CLO2	S	M	M	M
CLO3	S	S	M	M
CLO4	S	M	S	M
CLO5	S	S	S	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(11Hrs)**

Boolean retrieval: Information retrieval problem - Processing Boolean queries - Boolean model versus ranked retrieval. **The term vocabulary** and postings lists: Document delineation and character sequence decoding - Determining the vocabulary of terms - Faster postings list intersection via **skip pointers** - **Positional postings and phrase queries**

UNIT II **(12Hrs)**

Dictionaries and tolerant retrieval: Search structures for dictionaries - **Wildcard queries** - Spelling correction - Phonetic correction. Index construction: Hardware basics - **Blocked sort-based indexing** - **Single-pass in-memory indexing** - Distributed indexing - Dynamic indexing - Other types of indexes

UNIT III **(12Hrs)**

Scoring, term weighting and the **vector space model**: Parametric and zone indexes - Term frequency and weighting - The vector space model for scoring. **Evaluation in information retrieval**: Information Retrieval system – Standard test Collection – Evaluation of unranked retrieval sets – **Evaluation of ranked retrieval results** – Assessing relevance

UNIT IV **(12 Hrs)**

XML retrieval : Basic XML concepts – A vector space model for XML retrieval – Evaluation of XML retrieval - Text-centric vs. data-centric XML retrieval. **Text classification and Naive Bayes**: The text classification problem - Naive Bayes text classification - Properties of Naive Bayes - Feature selection - **Evaluation of text classification**

UNIT V **(11Hrs)**

Vector space classification: Document representations and measures of relatedness in vector spaces – **Rocchio classification** - Flat clustering: Clustering in information retrieval - Evaluation **of clustering** - **K-means** – Web search basics - Web characteristics - Advertising as the economic model – Search user experience – Basic Page Rank

Text Books

1.Christopher D. Manning, Prabhakar Raghavan, Henrich Schutze (2018). Introduction to Information Retrieval, 1/e; New York: Cambridge University Press

Reference Books

1. Stefan Buttcher et.al (2012). Information Retrieval - Implementing and Evaluating, MIT Press
2. Dr Ricardo Baeza-Yates et.al (2011). Modern Information Retrieval: The Concepts and Technology, Addison Wesley
3. David A. Grossman and Ophir Frieder (2010). Information Retrieval,2/e, Universities Press

Pedagogy: Lectures, Demonstrations, Guest Lectures, Video Lectures

Course Designers

1. Dr. S. Poongodi
2. Dr. S. Sasikala

MCS23E6	NATURAL LANGUAGE PROCESSING	Category	L	T	P	Credits
		III	58	2	-	4

Preamble

This course introduces the methods in Natural Language Processing (NLP). This course includes the various algorithms used in NLP. This course also covers various NLP tools and techniques

Prerequisite

- Data mining concepts
- Machine Learning Concepts

Course Learning Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of NLP in handling text data	**K2**
CLO2	Apply NLP analytical techniques on real time text data	**K3**
CLO3	Analyse text data with appropriate NLP algorithms and techniques.	**K4**
CLO4	Evaluate different NLP algorithms for handling and optimizing text data	**K5**
CLO5	Design and develop models for accomplishing NLP task	**K6**

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	S	M	L
CLO2	S	S	L	M
CLO3	S	S	S	S
CLO4	S	M	S	S
CLO5	S	M	S	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(11 Hrs)**

Introduction to NLP - Regular Expressions – **Words – Corpora** – Text Normalization – N-gram Language Models – N-Grams – Evaluating Language Models – Smoothing – Naïve Bayes Classifiers Training the NB Classifier – **Worked example**.

UNIT II **(11 Hrs)**

Logistic Regression: Learning in Logistic Regression – The cross-entropy loss function – Gradient Descent – **Regularization -** Vector semantics and embeddings – Lexical semantics – vector semantics **- words and vectors** – TF-IDF: weighing terms in the vector – **Word2vec** – **visualizing embeddings.**

UNIT III **(12 Hrs)**

Sequence labelling for parts of speech and named entities: English word classes – parts-of-speech tagging – **named entities and named entities tagging** – Constituency Grammars: constituency – context-free grammar. Logical representation of sentence meaning – first-order logic **- event and state representation**. Information Extraction: relation extraction – extraction events and their time

UNIT IV **(12 Hrs)**

Word senses and wordnet – word sense – relation between sense – **wordnet: a database of lexical relations**. Semantic role labelling – semantic roles – Framenet **- semantic role labelling**– Lexicons for Sentiment, Affect and Connotation: Defining emotion – available sentiment and affect lexicons – creating affect lexicons by human labelling.

UNIT V **(12 Hrs)**

Question Answering: Information retrieval **- Knowledge based question answering - Chatbots & dialog system: properties of human conversation – chatbots.**Phonetics: Speech Sounds and Phonetic Transcription – Automatic Speech Recognition and Text-to-Speech: The automatic speech recognition task – Feature extraction for ASR: Log Mel Spectrum – Speech Recognition Architecture.

Text Books

1. Daniel J and James H. Martin, "Speech and language processing: An introduction to natural language processing, computational linguistics & speech recognition", prentice hall,2020.

Reference Books

1.Lan H Written and Elbef, MarkA. Hall, "Data mining: practical machine learning tools and techiniques", Morgan Kaufmann,2013.

2.Steven Bird, Ewan Klein, and Edward Loper, "Natural Language Processing with Python", O'Reilly, 2009.

3. NitinIndurkhya, Fred J. Damerau, "Handbook of Natural Language Processing
4. Dwight Gunning, Sohom Ghosh, Natural Language Processing Fundamentals, Packt Publishers,2019.
5. Hobson Lane, Hannes Hapke, and Cole Howard, "Natural Language Processing in Action: Understanding, analyzing, and generating text with Python", Manning Publications, First edition, 2019.

Pedagogy: Lectures, Group Discussions, Case studies

Course Designers

1. Dr. M. Sasikala
2. Dr. S. Poongodi

MCS23E7	SOCIAL MEDIA ANALYTICS	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

The course covers concepts and techniques for retrieving, exploring, visualizing, and analyzing social network and social media data. Students learn the key metrics to assess social media goals, perform social network analysis to apply social media analytics process and formulate effective strategies based on the analytics.

Prerequisite

- Foundations of Data Science

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand sources and limitations of social media data.	**K2**
CLO2	Apply social media analytics process and evaluate metrics.	**K3**
CLO3	Examine different social media platforms and their associated tools	**K4**
CLO4	Apply social media information to create dashboards and reports for visualization.	**K5**
CLO5	Design effective strategy based on the social media analytics data.	**K6**

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	M	M	M
CLO2	S	S	M	M
CLO3	S	M	S	M
CLO4	S	S	S	M
CLO5	S	S	M	M

S- Strong, M-Medium, L-Low

Syllabus

UNIT I **(11 Hrs)**

Foundation for Analytics: – Digital Gap – Social Media Data Sources – Defining Social Media Data– Data Sources – Estimated vs. Factual Data Sources – Data Gathering in Social Media Analytics. **From Data to Insights:** Actionable Analytics – Focus on objective – Plan to shape data to insights – choosing

a good analytics tool – Data Aggregation calculations and display – Data display – Social media and its data – Potential Challenges. **Data Identification: Professional** networking sites - social sites – formation sharing sites – microblogging sites – blogs /wikis.

UNIT II **(12 Hrs)**

Analytics in social media: Types of analytics. Dedicated Vs. Hybrid Tools – Dedicated tools – Hybrid tools – Data Integration Tools – Best Setup. **Social Network Landscape:** Concept and UX on social networks – Interactivity of social network – Content flow on social network – Interaction Pattern between users –social media as a two-way channel.

UNIT III **(12 Hrs)**

Analytics Process: Analysis – Insight – Investigation beyond social analytics – Shaping a method – analysis cycle – Community Activity – Resources – Attention span – Dynamic cycles – Short Periods – Long Periods – Analyst Mindset – Instinctive Analyst. **Metrics:** Introduction – Default and custom metrics – Metrics Categories – Graph Types – Metric Capabilities – Metrics and Strategy – Estimated Metrics–Metrics and Tactics.

UNIT IV **(12 Hrs)**

Dashboards: Purpose and Objectives – Default Vs. Custom Dashboards – Linearity and order of metrics – Metrics Positioning and Correlation – Metric and dashboard layout – Graphic design – Data Integration dashboards. **Reports:** Elements of reporting – Reporting approaches and formats – Animation and effects in reporting – Stake holders and feedback – Reporting with teams.

UNIT V **(11 Hrs)**

Strategy: Strategy in social media analytics – Strategic planning – Data availability and data sources – Knowledge beyond social media – Tools and technology preparation – Team Preparation – Goals and objectives – Contingency plans – application of social media analytics strategy – Strategy and tactics – Evaluation of a strategic analytics cycle.

Case Studies : Targeting the audience using Facebook Analytics, Tracking profile analytics in LinkedIn, Analysis of Political Tweets, ROI Analytics using Facebook, Marketing Strategy in Pinterest.

Text Book

Alex Goncalves (2017). Social Media Analytics Strategy: Using Data to Optimize Business Performance, APress

Reference Books

1. Ganis, Kohirkar (2016). Social media Analytics, IBM Press PTG, 1st Edition
2. Nancy Flynn (2012). The Social Media Hand book Policies, and Best Practices, Wiley

Pedagogy: Lectures, Demonstrations, Group Discussions, Case studies

Course Designers

1. Dr. S. Poongodi
2. Dr. S. Sasikala

MCS23E8	SOFT COMPUTING	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course aims to explain importance of optimization techniques and genetic programming and to gather knowledge about various hybrid soft computing techniques and apply in real time problems

Prerequisite

Basic knowledge of problem solving and Networking.

Course Outcomes

Upon the successful completion of the course, students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the concepts of soft computing and their applications	**K2**
CLO2	Apply supervised and unsupervised learning in neural networks	**K3**
CLO3	Analyze soft computing techniques for small applications	**K4**
CLO4	Evaluate the results of knowledge base system	**K5**
CLO5	Design soft computing techniques suitable for real time applications	**K6**

Mapping with Programme Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	S	M	M
CLO2	S	M	S	M
CLO3	S	M	M	S
CLO4	S	M	S	S
CLO5	S	S	M	S

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(11 hrs)**

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-**Adaline Network-Madaline Network.**

UNIT II **(11 hrs)**

Neural Networks Back Propagation Neural Networks - Kohonen Neural Network -Learning Vector Quantization -Hamming Neural Network - Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines - **Spike Neuron Models**

UNIT III **(12 hrs)**

Fuzzy system Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - **Fuzzy Rule Base and Approximate Reasoning** - **Introduction to Fuzzy Decision Making**

UNIT IV **(12 hrs)**

Genetic Algorithm Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - **Bit-wise Operators** - **Convergence of Genetic Algorithm**

UNIT V **(12 hrs)**

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy Art Map: A Brief Introduction - Soft Computing Tools - GA in Fuzzy **Logic Controller Design** - Fuzzy Logic Controller

Text Books

1. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt.Ltd., 2017..
2. S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt.Ltd., 2nd Edition, 2011

Reference Books

1. Vinoth Kumar and R. Saravana Kumar (2012). Neural Network and Fuzzy logic, S.K. Katria& Sons
2. Haykin Simon (2011). Neural Networks and Learning Machines, Prentice Hall of India
3. Tang,Tan and Yi (2010).Neural Networks: Computational Models and Application, Springer Verlag Publications

Pedagogy: Lectures, Group Discussions, Case studies

Course Designers

1. Dr. S. Lakshmi Priya
2. Dr. S. Sasikala

MCS23E9	VIRTUAL REALITY	Category	L	T	P	Credit
		III	58	2	-	4

Preamble

This course provides the technology behind virtual reality and introduces input, output devices used for virtual reality. It also presents the techniques and applications used for augmented reality.

Prerequisite

- Animation Techniques
- Image Processing

Course Outcomes

On successful completion of the course, the students will be able to

CLO Number	CLO Statement	Knowledge Level
CLO1	Understand the basic concepts of virtual reality	K2
CLO2	Apply appropriate techniques and design augmented reality applications	K3
CLO3	Analyze the techniques required for virtual reality environments	K4
CLO4	Assess the methods and techniques appropriate for virtual reality applications	K5
CLO5	Design and manipulate objects within the virtual environment.	K6

Mapping with Programming Outcomes

CLOs	PO1	PO2	PO3	PO4
CLO1	S	M	M	M
CLO2	M	M	M	M
CLO3	M	M	M	M
CLO4	S	M	M	M
CLO5	S	M	M	M

S- Strong; M-Medium; L-Low

Syllabus

UNIT I **(11 Hrs)**

Introduction: The Three I's of Virtual Reality - A Short History of Early Virtual Reality – Early Commercial VR Technology - **VR Becomes an Industry - The Five Classic Components of a VR System.**

UNIT II **(12 Hrs)**

Input Devices: Three – Dimensional Position trackers - Hybrid Inertial Trackers - Navigation and Manipulation Interfaces - Tracker-Based Navigation/Manipulation Interfaces – **Three-Dimensional Probes** - Gesture Interfaces - The Pinch Glove - The 5DT Data Glove - The Didjiglove - The CyberGlove.Output Devices: Graphics Displays: The Human Visual System -Personal Graphics Displays -Large- Volume Displays - Sound Displays - The Human Auditory System - The Convolvotron– **Speaker Based Three-Dimensional Sound - Haptic Feedback: The Human Haptic System - Tactile Feedback Interfaces - Force Feedback Interfaces**

UNIT III **(12 Hrs)**

Getting started with Unity and Playmaker: **Downloading and Installing Unity** – **Buying and importing playmaker – Setting up your project.** Unity's and Playmaker's User Interface: Interface overview and main menu – Hierarchy panel – Inspector panel – Project panel – Project panel – Views – Playmaker interface. Components and State Machines: Game objects, components and properties – Working with prefabs – Finite state machines, states and actions – **Interaction between game objects**

UNIT IV **(11 Hrs)**

Scripting and Custom Actions: Writing unity script – Overview of standard unity classes – Creating a playmaker action. Networking and Multiplayer: **Understanding networking and multiplayer** – **Setting up photon unity networking** – **Making multiplayer**

UNIT V **(12 Hrs)**

Introduction to Augmented Reality: Definition – Examples – Displays - Visual perception -Requirements and characteristics – Tracking - Characteristics of tracking technology- Stationary tracking systems - Mobile sensors. Computer Vision for Augmented Reality: **Natural feature tracking by detection** – **Simultaneous localization and mapping** – **Interaction - Output modalities** – Input modalities – Tangible interfaces –Navigation

Reference Books

1. Grigore C. Burdea, Philippe Coiffet (2010),Virtual Reality Technology, 2/e, Wiley Dream Tech India
2. Sergey Mohov (2013), Practical Game Design with Unity and Playmaker, Packt Publishing Ltd.
3. Dieter Schmalstieg, Tobias Hollerer (2016), Augmented Reality : Principles and Practice, Pearson education Inc
4. Jonathan Linowes , Krystian Babilinski (2017), Augmented reality for developers, 1/ e, Packt Publishing
5. William R. Sherman, Alan B. Craig (2013), Understanding Virtual Reality: Interface, Application and Design, Morgan Kaufmann Publishers

Pedagogy

Lectures**,** GroupDiscussions, Demonstrations

Course Designers

1. Mrs.A.Sheela Rini
2. Dr.R.Kowsalya