SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

M. TECH. COMPUTER SCIENCE & ENGINEERING

Semester I

Subject Category	**DC**	Subject Code:	**MCSE-101**	Subject Name:	**Advanced Data Structure**

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
60	**20**	**20**			**100**	**3**	**1**		**4**

Prerequisites:

Programming and Basic Mathematical knowledge.

Course Objective:

1. To introduce and practice advanced algorithms and programming techniques necessary for developing sophisticated computer application programs
2. To get accustomed with various programming constructs such as divide-and-conquer, backtracking, and dynamic programming.
3. To learn new techniques for solving specific problems more efficiently and for analysing space and time requirements.

Course Outcomes:

The students would be able to

CO-1: Students are familiar with algorithmic techniques such as brute force, greedy, and divide and conquer.

CO-2: Application of advanced abstract data type (ADT) and data structures in solving real world problems.

CO-3: Effectively combine fundamental data structures and algorithmic techniques in building a complete algorithmic solution to a given problem.

UNITs	Descriptions	Hrs.	CO's
I	Review of order rotation & growth of functions, recurrences, probability distributions, Average case analysis of algorithms, Basic data structures such as stacks, queues, linked lists, and applications.		
II	Direct access tables and hash tables, hash functions and relates analysis, Binary Search trees and Operations, AVL Trees and balancing operations, R B Trees, properties, operations.		
III	B – Trees – definition – properties, operations, data structures for disjoint sets, Graph algorithms, MST single source all pair shortest paths, BFS, DFS, topological sort, strongly connected component.		
IV	Algorithmic paradigms Greedy Strategy, Dynamic programming, Backtracking, Branch-and-Bound, Randomized algorithms.		
V	Representation of graph: Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra‟salgorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree –Prim's & and Kruskal algorithms.graph algorithms – maximal independent sets, coloring vertex cover, introduction to perfect graphs.		
Guest Lectures (if any)			
Total Hours		40	

Suggestive list of experiments:

Text Book-

Reference Books-

1. H. S. Wilf, Algorithms and complexity, Prentice hall.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Introduction to Algorithms, Prentice hall.
3. K. Vishwanathan Iyer, Lecture notes for classroom use.

Modes of Evaluation and Rubric

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

M. TECH. COMPUTER SCIENCE & ENGINEERING

Semester I

Subject Category	DC	Subject Code:	MCSE-102	Subject Name:	Data Science

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
60	**20**	**20**			**100**	**3**	**1**		**4**

Prerequisites:

Basic knowledge of discrete maths, probablity and calculus

Course Objective:

1. To provide the knowledge and expertise to become a proficient data scientist
2. Demonstrate an understanding of statistics and machine learning concepts that are vital for data science;
3. Produce Python code to statistically analyze a dataset
4. Critically evaluate data visualizations based on their design and use for communicating stories from data;

Course Outcomes:

The students would be able to

CO1: To understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists.

CO2: To explain how data is collected, managed and stored for data science.

CO3: Examine the techniques of Data Visualization.

CO4: Identification of various applications of Data Science.

UNITs	Descriptions	Hrs.	CO's
I	Introduction to core concepts and technologies: Introduction Terminology, data science process, Data science toolkit, Types of data, Example applications.		
II	Data collection and management: Introduction, Sources of data, Data collection and APIs. Exploring and fixing data. Data storage and management, Using multiple data sources.		
III	Data analysis: Introduction , Terminology and concepts. Introduction to statistics Variance ,Distribution properties and arithmetic Samples/CLT, Basic machine learning algorithms ,Linear regression ,SVM, Naive Bayes.		
IV	Data Visualization: Introduction ,Types of data visualization, Data for visualization, Data types, Data encodings, Retinal variables, Mapping variables to encodings. Visual encodings.		
V	Applications of Data Science Technologies for visualization, Bokeh (Python) Recent trends in various data collection and analysis techniques various visualization techniques, application development methods of used in data science.		
Guest Lectures (if any)			
Total Hours		40	

Reference Books-

1. Cathy O'Neil and Rachel schutt ,Dong Data Science, Straight Talk from the Frontline. O'Reilly.
2. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman . Mining of Massive Datasets. V2.1. Cambridge University Press.
3 "Introducing Data Science" by Davy Cielen, Arno D. B. Meysman, Mohamed Ali, 1st Edition, Manning Publications Co.

Modes of Evaluation and Rubric

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)
M. TECH. COMPUTER SCIENCE & ENGINEERING
Semester I

Subject Category	DC	Subject Code:	MCSE-103	Subject Name:	Advance Computer Network

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
60	20	20			100	3	1		4

Prerequisites:

Course Objective:

The objective of this course is to understand the working principle of various communication protocols and analyze the various routing algorithms.

Course Outcomes:

The students would be able to:
CO1: Develop a fundamental understanding of network design principles and structure of computer network.
CO2 Understand fundamental concepts of Logical addressing, sub netting & related protocols.
CO3 Describe and examine working of Transport Layer protocol.
CO4: Analyze the features and operations of various routing protocols such as Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing
CO5:Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET and VPN

UNITs	Descriptions	Hrs.	CO's
I	Review of Networking and O.S. fundamentals, ISO-OSI Model, different layers and their functions, TCP/IP 5-Layer Reference Model , LAN, MAN, WAN, Communication media & principles IEEE standards etc.		
II	Internet Protocol: IPv4, IPv6, Datagram Type Of Service, Datagram Encapsulation, Datagram Fragmentation and Reassembly, Error And Control Messages ICMP. Internet Addressing: IPv4 Classful Addressing Scheme, Fixed Length IPv4 Subnets , Variable-Length IPv4 Subnet, CIDR Notation, Classless IPv4 Addressing, ARP and RARP		
III	User Datagram Protocol, Message Format, UDP Multiplexing, Demultiplexing And Protocol Ports , TCP: Properties, Reliability, Sliding Window Paradigm, TCP Connection Establishing, Silly Window Syndrome.		
IV	Introduction to Router, Configuring a Router, Interior & Exterior Routing, RIP, Distance Vector Routing, OSPF, BGP, Uni-cast, Multicast and Broadcast. Multicast routing protocols: DVMRP, MOSPF, CBT, PIM, MBONE, EIGRP, CIDR, Multicast Trees,		
V	VPN addressing and routing, VPN Host management, VPN Addressing And Routing, VPN With Private Addresses, Application layer protocol: TELNET, RLOGN , FTP, TFTP, NFS, SMTP, POPL, IMAP, MIME, DHCP, VOIP, SNMP.		
Guest Lectures (if any)			
Total Hours		40	

Reference Books-

1. Computer Networks: Tanenbaum.
2. Internetworking with TCP/IP: Comer.
3. Data Communications, Computer Networks and Open Systems: Hallsall.
4. Data Communications, Stalling.
5. TCP/IP protocol Suite, Forouzan ,TMH

Modes of Evaluation and Rubric

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

M. TECH. COMPUTER SCIENCE & ENGINEERING

Semester I

Subject Category	**DE**	Subject Code	**MCSE-104(B)**	Subject Name	**Digital Image Processing**

Maximum Marks Allotted				Contact Hours			Total Credits
Theory			Total Marks				
End Sem	Mid-Sem	Quiz		L	T		
60	**20**	**20**	**100**	**3**	**1**		**4**

Prerequisites:

Knowledge of Computer Programming Language and MATLAB.

Course Objective:

1.To study the image fundamentals and mathematical transforms necessary for image processing.
2.To study the image enhancement techniques
3.To study image restoration procedures.
4.To study the image compression procedures.

Course Outcomes:

The students would be able to
CO-1: Ability to apply principles and techniques of digital image processing in applications related to design and analysis of digital imaging systems.
CO-2: Ability to analyze and implement image processing algorithms to real problems.
CO-3: Gaining of hands-on experience in using software tools for processing digital images.
CO-4: Interpret image segmentation and representation techniques.
CO-5: Apply Mathematical Morphology using Polynomial approximation

UNITs	Descriptions	Hrs.	CO's
I	Digital Image fundamentals, A simple image model, Image sampling and quantization, Relationship between pixels, Imaging Geometry, Images databases and data structures, Different types of digital Images & Applications.		
II	Image Transformations, Two-dimensional (2D) impulse and its shifting properties, 2D continuous Fourier Transform pair, 2D sampling and sampling theorem, 2D Discrete Fourier Transform (DFT), properties of 2D DFT. Other transforms and their properties: Cosine transform, Sine transform, Walsh transform, Hadamard transform, Haar transform, Slant transform, KL transform.		
III	Image Enhancement Spatial domain methods: basic intensity transformation functions, fundamentals of spatial filtering, smoothing spatial filters (linear and non-linear), sharpening spatial filters (unsharp masking and high boost filters), combined spatial enhancement method. Frequency domain methods: basics of filtering in frequency domain, image smoothing filters (Butterworth and Gaussian low pass filters), image sharpening filters (Butterworth and Gaussian high pass filters), selective filtering.		
IV	Image Segmentation Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean-Shift, MRFs, Texture Segmentation; Object detection. Pattern Analysis Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.		
V	Digital Watermarking and Steganography, Basics of image compression standard-JPEG, MPEG, Basics of vector quantization, mathematical morphology-Binary, Dilation, crosses, Opening & Closing, Simple method of representations, Signatures boundary segments, Skelton of region, Polynomial approximations		
Guest Lectures (if any)			
Total Hours		40	

Reference Books-

1 Digital Image Processing, Gonzalez.R.C & Woods. R.E., 3/e, Pearson Education, 2008.
2. Digital Image Processing, Kenneth R Castleman, Pearson Education,1995.
3. Digital Image Procesing, S. Jayaraman, S. Esakkirajan, T. Veerakumar, McGraw Hill Education ,2009. Pvt Ltd, NewDelhi
4. Fundamentals of Digital image Processing, Anil Jain.K, Prentice Hall of India, 1989. 5. Image Processing, Sid Ahmed, McGraw Hill, New York, 1995.
5. Frank Y. Shih, "Digital Watermarking and Steganography: Fundamentals and Techniques", CRC Press, USA, 2007.

Modes of Evaluation and Rubric

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

M. TECH. COMPUTER SCIENCE & ENGINEERING

Semester I

Subject Category	DE	Subject Code:	MCSE-105(B)	Subject Name:	Soft Computing

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
60	20	20			100	3	1		4

Prerequisites:

Calculus, Differential equations, Linear algebra (Vectors, matrices), Logic, Set theory

Course Objective:

A) Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
B) Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.

Course Outcomes:

At the end of the course The students will be able to

CO-1: Discuss searching algorithms and about architecture, classification, functioning and characteristics of network
CO-2: Describe neural network, list the models of NN, and relate them
CO-3: Discuss perception, back propagation networks and explain MLP, its applications
CO-4: Compare, explain fuzzy logic, fuzzy systems & categorize applications
CO-5: Design genetic algorithms applications

UNITs	Descriptions	Hrs.	CO's
I	Introduction of soft computing, soft computing vs hard computing. Soft computing techniques. Computational Intelligence and applications, problem space and searching: Graph searching, different searching algorithms like breadth first search, depth first search techniques, heuristic searching Techniques like Best first Search, A* algorithm, AO* Algorithms. Game Playing: Minimax search procedure, adding alpha-beta cutoffs, additional refinements, Iterative deepening, Statistical Reasoning: Probability and Bayes theorem, Certainty factors and Rules based systems, Bayesian Networks, Dempster Shafer theorem.		
II	FUZZY LOGIC: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making .		
III	NEURAL NETWORKS: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks .		
IV	Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural Networks , Reinforcement Learning.		
V	GENETIC ALGORITHMS: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition ,Genetic Modelling.		
Guest Lectures (if any)			
Total Hours		40	

Reference Books-

1. S.N. Shivnandam, "Principle of soft computing", Wiley India.
2. David Poole, Alan Mackworth "Computational Intelligence: A logical Approach" Oxford.
3. Russell & Yuhui, "Computational Intelligence: Concepts to Implementations", Elsevier.
4. Eiben and Smith "Introduction to Evolutionary Computing" Springer
5. E. Sanchez, T. Shibata, and L. A. Zadeh, Eds., "Genetic Algorithms and Fuzzy Logic Systems: Soft Computing Perspectives, Advances in Fuzzy Systems - Applications and Theory".

Modes of Evaluation and Rubric

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	
Subject handled by department	