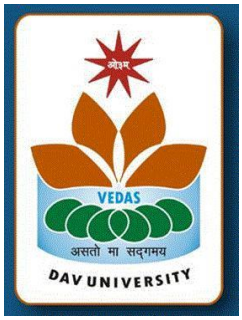
DAV UNIVERSITY JALANDHAR



Course Scheme & Syllabus

For

Master of Technology in Computer Science Engineering

Examinations 2019–2020 Session

Syllabi Applicable For Admissions in 2019

Session 2019–2020

M Tech (Computer Science Engineering)

Semester	Course Code	Course Title	L	T	P	Cr	Nature of Course
1	MGT551	Research Methodology	4	0	0	4	Core
1	MTH551A	Numerical Analysis	4	0	0	4	Core
1	CSE501	Advance Computer Networks & Simulation	4	0	0	4	Core
1	CSE503	Data Mining & Warehousing	4	0	0	4	Core
1	CSE505	Parallel Computing & Architecture	4	0	0	4	Core
1	CSE507	Advance Computer Networks & Simulation- Lab	0	0	3	2	Core (Lab)
	CSE509	Data Mining & Warehousing-Lab	0	0	3	2	Core (Lab)
			20	**0**	**6**	**24**	
Semester	**Course Code**	**Course Title**	**L**	**T**	**P**	**Cr**	**Nature of Course**
2	CSE502A	Digital Image Processing	3	0	0	3	Core
2		Discipline Specific Elective -1	4	0	0	4	DSE-1
2		Discipline Specific Elective -2	3	0	0	3	DSE-2
2		Discipline Specific Elective -3	4	0	0	4	DSE-3
2		Generic Elective-1	4	0	0	4	GE-1
2	CSE540	Digital Image Processing Lab	0	0	2	1	Core (Lab)
2		Discipline Specific Elective -2 Lab	0	0	2	1	DSE-2-Lab
2	CSE526B	Seminar Based on literature survey	0	0	3	2	Seminar
			18	**0**	**7**	**22**	
Semester	**Course Code**	**Course Title**	**L**	**T**	**P**	**Cr**	**Nature of Course**
3		Discipline Specific Elective -4	4	0	0	4	DSE-4
3		Generic Elective -2	4	0	0	4	GE-2
3	CSE613	Dissertation Part - 1	0	0	0	8	Dissertation Part - 1
			8	**0**	**0**	**16**	
Semester	**Course Code**	**Course Title**	**L**	**T**	**P**	**Cr**	**Nature of Course**
4	CSE600A	Dissertation Part - 2	0	0	0	12	Dissertation Part - 2
			0	0	0	**12**	

Discipline Specific Electives

DSE-1	Course Code	Course Title	L	T	P	Cr.	Area of Specialization
	CSE508	Information Security and risk management	4	0	0	4	Network & Security
	CSE504	Software Metrics and Quality Engineering	4	0	0	4	Software Engg.
	CSE530	Pattern Recognition & Analysis	4	0	0	4	Computer Vision & Image processing
	CSE552	Distributed Databases	4	0	0	4	Distributed Computing
	CSE554	Artificial Intelligence	4	0	0	4	Algorithms and AI

DSE-2	Course Code	Course Title	L	T	P	Cr.	Area of Specialization
	CSE506B	Wireless Data Networks	4	0	0	4	Network & Security
	CSE534	Agile Software Development Approaches	4	0	0	4	Software Engg.
	CSE532	Bioinformatics	4	0	0	4	Computer Vision & Image processing
	CSE518	Distributed Computing Systems	4	0	0	4	Distributed Computing
	CSE528	Advanced Data Structure & Algorithms	4	0	0	4	Algorithms and AI

DSE-2 Lab	Course Code	Course Title	L	T	P	Cr.	Area of Specialization
	CSE524A	Wireless Data Networks Lab	0	0	2	1	Network & Security
	CSE542	Agile Software Development Lab	0	0	2	1	Software Engg.
	CSE538	Bioinformatics Lab	0	0	2	1	Computer Vision & Image processing
	CSE548	Distributed Computing Systems lab	0	0	2	1	Distributed Computing
	CSE536	Advanced Data Structure & Algorithms Lab	0	0	2	1	Algorithms and AI

SE-3	Course Code	Course Title	L	T	P	Cr.	Area of Specialization
	CSE520	Network Security	4	0	0	4	Network & Security
	CSE542	Unified Software Configuration Management	4	0	0	4	Software Engg.
	CSE544	Machine Learning	4	0	0	4	Computer Vision & Image processing
	CSE546	Cloud Computing	4	0	0	4	Distributed Computing
	CSE550	Natural language and Processing	4	0	0	4	Algorithms and AI

DSE-4	Course Code	Course Title	L	T	P	Cr.	Area of Specialization
	CSE621	Network Intrusion Detection	4	0	0	4	Network & Security
	CSE603	Software Project Management	4	0	0	4	Software Engg.
	CSE617	Medical Image Analysis & Visualization	4	0	0	4	Computer Vision & Image processing
	CSE619	Grid Computing	4	0	0	4	Distributed Computing
	CSE601	Evolutionary Methods	4	0	0	4	Algorithms and AI

L: Lectures T: Tutorial P: Practical Cr: Credits

Generic Electives

S. No	Course Code	Course Title	L	T	P	Cr.
1	ELE901	Renewable Energy Sources	4	0	0	4
2	ELE902	Energy Audit and Management	4	0	0	4
3	CHL901	Analytical Techniques	4	0	0	4
4	CHL902	Pollution Abatement and Control Equipment's	4	0	0	4
5	MEC901	Methods Engineering and Ergonomics	4	0	0	4
6	MEC902	Power Plant Engineering	4	0	0	4
7	CSE901	Soft Computing	4	0	0	4
8	CSE902	Mobile Communications	4	0	0	4
9	ECE901	Smart Sensors	4	0	0	4
10	ECE902	Silicon Chip Technology	4	0	0	4
11	CIV901	Transportation Engineering	4	0	0	4
12	CIV902	Water Resource Engineering	4	0	0	4
13	MGT051	Business Strategy	4	0	0	4
14	MGT052	Principles of Marketing	4	0	0	4

L: Lectures T: Tutorial P: Practical Cr: Credits

Detailed Syllabus

Course Title: Research Methodology

Course Code: MGT551

L	T	P	Credits
4	0	0	4

Course Objective: The course is designed to introduce the students to research methodology and application of research techniques and procedures. The primary goal of this course is to develop a sound understanding of research methods.

Learning Outcomes: The students will be able to apply the various research methods by using computerized data analysis software's to solve the real life problems.

UNIT – A

Introduction to Research: Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.

Defining the Research Problem: What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, factors affecting RDs, Relation among RDs, Developing a Research Plan.

14Hours

UNIT – B

Sampling design and Procedures: Sample or Census, The Sampling Design Process, Classification of Sampling Techniques, Choosing Non-probability Versus Probability Sampling, Uses of Non probability Versus Probability Sampling.

Measurement and Scaling: Non-comparative Scaling Techniques, Continuous Rating Scale, Itemized Rating Scale, Non-comparative Itemized Rating Scale Decisions, Multi-item Scales, Scale Evaluation, Choosing a Scaling Technique.

Methods of Data Collection: Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection.

Questionnaire & form design: questionnaire & observation forms, questionnaire design process.

14Hours

UNIT – C

Data preparation: editing, coding, transcribing

Data analysis: tests of significance based on t, f and z distribution and chi-square test; cross tabulation

Multiple Regression: Overview of Multiple Regression, Statistics Associated with Multiple Regression, Conducting Multiple Regression, Stepwise Regression, Multicollinearity

Discriminant Analysis: Discriminant Analysis Model, Statistics Associated with Discriminant Analysis, Conducting Discriminant Analysis

Conjoint Analysis: Basic Concepts in Conjoint Analysis, Statistics Associated with Conjoint Analysis, Conducting Conjoint Analysis, Assumptions & Limitations of Conjoint Analysis, Hybrid Conjoint Analysis.

12Hours

UNIT – D

Multi-Dimensional Scaling: Basic Concepts in Multidimensional Scaling (MDS), Statistics Associated with MDS, Conducting Multidimensional Scaling, Selecting an MDS Procedure, Deciding on the Number of Dimensions, Labeling the Dimensions & Interpreting the Configuration, Assessing Reliability and Validity, Assumptions & Limitations of MDS, Scaling Preference Data

Correspondence Analysis: Relationship between MDS, FA, & DA
Factor Analysis: Factor Analysis Model, Statistics Associated with Factor Analysis, Conducting Factor Analysis, Applications of Common Factor Analysis
Cluster Analysis: Statistics Associated with Cluster Analysis, Conducting Cluster Analysis, and Applications of Non-hierarchical Clustering, Clustering Variables.
Research Report Writing: Contents of Report, Executive Summary, and Bibliography format, Presentation of Report.

12Hours

REFERENCES:

1. Bajpai Naval, *Business Research Methods*, Pearson Publications.
2. Malhotra, Naresh K. *Marketing Research: An Applied Orientation*, 5th Edition. Pearson/Prentice-Hall, 2007.
3. Proctor Tony, *Essentials of Marketing Research*, Prentice Hall, 4th Edition.
4. Beri, G. C. Marketing research, McGraw-Hill, 4th Edition
5. Kothari, C.R. *Research Methodology*, New Age Publishers.

L	T	P	Credits
4	0	0	4

Course Title: Numerical Analysis
Course Code: MTH551A

Course Objective:
The aim of this course is to teach the applications of various numerical techniques for a variety of problems occurring in daily life. At the end of the course, the students will be able to do programming in MATLAB and understand the basic concepts in Numerical Analysis of differential equations.

Learning Outcomes: The students will be able to apply various numerical analysis techniques to solve problems of approximation, algebraic equations, differential equations, etc.

UNIT-A

Introduction: Approximate numbers, Significant figures, rounding off numbers, Error Absolute, Relative and percentage

Algebraic and transcendental equations: Review of some concepts, Solution of algebraic and transcendental equations: Bisection method, RegulaFalsi, Newton Raphson, Lin Barstow's, convergence.

Systems of simultaneous Equations: Crammer's rule, Gauss elimination, Gauss Jordon Method, Matrix inversion method, Iterative methods: Jacobi method and Gauss-Seidel method, partition method, Eigen values and Eigen vectors: Cayley Hamilton theorem, Power method for finding largest Eigen value.

14Hours

UNIT –B

Finite Difference Methods: Forward, Backward, Central differences, Newton's forward, backward and divided difference formulae, Gauss, Stirling, Bessel central difference formulae.

12ours

UNIT –C

Numerical Differentiation and Numerical Integration: Numerical Differentiation, Trapezoidal and Simpson's one third, Simpson's three eight rule for numerical integration, adaptive integration, Taylor's series method, Euler, modified Euler method, Runge-Kutta methods, Boole, Weddle rule, Double integration.

12Hours

UNIT –D

Ordinary and Partial Differential Equations: Solution of second and higher order differential equations, boundary value problems, Solution of partial differential equations: Laplace, Heat, Wave equation.

12Hours

REFERENCES:

1. Atkinson, K.E. *An Introduction to Numerical Analysis*, Wiley, 1989.
2. Eriksson, K., Estep, D., Hansbo P. and Johnson, C. *Computational Differential Equations*, Cambridge Univ. Press, Cambridge, 1996.
3. Golub, G.H. and Ortega, J.M. *Scientific Computing and Differential Equations: An Introduction to Numerical Methods*, Academic Press, 1992.
4. Conte S.D. and Carl De Boor, *Elementary Numerical Analysis*, An Algorithmic Approach**,** Tata McGraw Hill, New Delhi, 1981.
5. Jain, M.K. *Numerical Analysis for Scientists and Engineers*, S.B.W. Publishers, Delhi, 1971.

Course Tile: Advanced Computer Networks and Simulation

Course Code: CSE501

L	T	P	Credits
4	0	0	4

Course Objectives: To understand the state-of-the-art in network protocols, architectures and applications and to analyze existing network protocols and networks.

Learning Outcomes: Explain the basic concepts of wireless network and wireless generations. To demonstrate the different technologies such as CDMA, GSM, GPRS and ATM Architecture and appraise the importance of Ad-hoc networks.

UNIT-A

Introduction: Review of Computer Networks and the Internet: What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet - Foundation of Networking Protocols: 5-layer TCP/IP Model, 7-Layer OSI?

Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

The Link Layer and Local Area Networks: Link Layer: Introduction and Services, Error- Detection and Error-Correction techniques, Multiple Access Protocols, Interconnections: Hubs and Switches.

14Hours

UNIT-B

ATM: Asynchronous Transfer Mode Switching (ATM): Overview of ATM: - Introduction, What is ATM, Genesis of ATM, Basic Principles of ATM, ATM Standards, ATM Protocol Stack: Physical Layer, ATM Layer and AAL Layer

Traffic Management in ATM-Traffic Contracting, Traffic Shaping, Traffic Policing, Priority Control, Flow Control, ATM Traffic Descriptors, ATM Service Descriptors (QoS Parameters), ATM Signalling and its Protocol, ATM Addressing & Routing, ATM Networking Standard.

14Hours

UNIT-C

Transport and End-to-End Protocols: Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), IPv6 packet format-transition from IPv4 to IPv6-Mobile IP, TCP Congestion Control Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Building a Simple Web Server

Medium Access Control (MAC) Techniques-goals and requirements of Medium Access Control (MAC) techniques, Classify various contention based techniques such as ALHOA, CSMA, CSMA/CD and CSMA/CA.

12Hours

UNIT-D

Mobile Communication: GSM (Global system for mobile communication)-Services and Architecture, GPRS (General Packet Radio Service)-reference model, DECT, CDMA.

Mobile A-Hoc Networks: Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks – Wireless Sensor Networks: Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols.Networking Simulation Tools- OPNET, Ns 2, QualNet.

14Hours

REFERENCES:

1. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
2. Guide to Networking Essentials, Greg Tomsho,Ed Tittel, David Johnson,Fifth Edition, Thomson
3. An Engineering Approach to Computer Networking, S.Keshav, Pearson Education.
4. Campus Network Design Fundamentals, Diane Teare, Catherine Paquet, Pearson Education.(CISCOPress)
5. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.
6. The Internet and Its Protocols,A.Farrel,Elsevier.

DAV UNIVERSITY, JALANDHAR

Course Title: Data Mining & Warehousing
Course Code: CSE503

L	T	P	Credits
4	0	0	4

Course Objective: This course will be an introduction to data mining and warehousing. Topics will range from statistics to database, with a focus on analysis of large data sets. Another objective is to study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems.
Learning Outcomes: Upon completion of the course, students will be able to:

- Understand the nature and purpose of data warehousing
- Describe the theoretical constructs and core processes of data warehousing
- Understand the role of data mining and warehousing in institutional research.
- Understand the basic statistical concepts related to data mining warehousing
- Describe the predictive modeling functions of data mining and warehousing
- Describe the potential applications of data mining in higher education i.e., decision support, assessment, accountability, resource allocation, enrolment management, and quality improvement initiatives.
- Use a data mining program to analyze sample data and develop predictive models.
- Be able to compare and evaluate the accuracy of predictive models based on classification and clustering.

UNIT-A

Data mining: Overview, Definition & Functionalities
Data Processing: Form of Data Pre-processing**,** Data Cleaning: Missing Values, Noisy Data, (Binning Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction: Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity, Reduction, Clustering, Discretization and Concept hierarchy generation

14Hours

UNIT-B

Concept Description: Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases.
Association rule mining: Mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm Mining Multilevel Association rules from Transaction Databases Mining Multi-Dimensional Association rules from Relational Databases

14Hours

UNIT-C

Classification and Predictions: What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbor classifiers, Genetic Algorithm.
Cluster Analysis: Data types in cluster analysis, Categories of clustering methods: Partitioning methods. Hierarchical Clustering-CURE and Chameleon, Density Based Methods-DBSCAN, OPTICS, Grid Based Methods-STING, CLIQUE, Model Based Method – Statistical Approach, Neural Network approach, Outlier Analysis

14Hours

UNIT-D

Mining Complex Types of Data: Multidimensional analysis & Descriptive mining of Complex data objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-series & Sequence data, Mining Text databases, Mining World -Wide Web

Data Mining Applications and Trends in Data Mining: Massive Datasets/Text mining, Agent Based Mining

14Hours

REFERENCES:

1. M.H.Dunham, Data Mining: Introductory and Advanced Topics, Pearson Education
2. Jiawei Han, Micheline Kamber, Data Mining Concepts & Techniques, Elsevie
3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer
4. S. Theodoridis and K. Koutroumbas, Pattern Recognition, 4th Edition, Academic Press, 2009.
5. Arun k. Pujari, Data Mining Techniques, Universities Press Private Limited.

Course Title: Parallel Computing & Architecture
Paper Code: CSE505

L	T	P	Credits
4	0	0	4

Course Objective: Students will learn about programming paradigms used in parallel computation, about the organization of parallel systems.
Learning Outcomes: After the completion of this course the participants would gain the knowledge of parallel organization of computers, their working and different components

UNIT-A

Parallel Computer Introduction: Basic issues and models, Computational speed laws, Computer Structures: Types of parallel computers: Parallel Processors, Array Computers, Multiprocessors, shared and distributed memory machines: MIMD, networked computers as a multi complier platform, symmetric multiprocessing.
Hardware Organization: Flynn's Classifications: SISD, SIMD, MISD, MIMD, Handler's classifications

14Hours

UNIT-B

Software Organization: Kung's Classification, SPMD: Single Program Multiple Data
Parallel Computational Models: Combinational Circuits, PRAM Models: Constrained PRAM Models, PRAM-CREW, EREW models, Handling Shared Memory Access Conflicts, Parallelism, Goals of parallelism, Parallelism and concurrency, Parallelism approaches: Data Parallelism, Control Parallelism.

14Hours

UNIT-C

Performance of Parallel Systems: Performance matrices for Parallel systems: Run time, Speed up, Efficiency and Cost, Laws governing performance measurements, Load Balancing: Fully Distributed, Semi distributed and centralized distributed, Bench Marks: Whetstone, Dhrystone.
Programming of Parallel Computers: Shared Memory Programming, Distributed Memory Programming, Object Oriented Programming, Data Parallel Programming, Functional and Dataflow Programming

14Hours

UNIT-D

Parallel Architecture: Taxonomy of parallel structures, Control mechanism, Address-Space Organization, Interconnection connection networks: Static and Dynamic interconnection networks, evaluating static interconnection networks, embedding other networks (Linear Array, Mesh, Binary Tree) into a hypercube; Routing mechanisms for static interconnection networks: Store and Forward (SF) Routing; Cut - Theory (CT) Routing; Cost-Performance trade-off; Architectural Models for Parallel Algorithm design.
Scheduling and Parallelization: Scheduling Parallel Programs, Loop scheduling, Parallelization of sequential programs.

14Hours

REFERENCES:

1. Kai, Hwang, "Computer Architecture and parallel processing", Tata McGraw Hill Co.
2. Vipin Kumar, Ananth Grama, Anshul Gupta and George Karypis "Introduction to Parallel Computing", Addison Wesley (2003) 2nd edition.
3. Barrey Wilkinson, Michael Allen "Parallel Programming" Pearson Education.
4. Hwang & Briggs F.A., "Computer Architecture and Parallel Processing "Tata McGraw Hill Co.
5. Michael J. Quinn, Parallel Computing: Theory and Practice, Tata McGraw-Hill, 4th Edition, ISBN: 9780070512948, 2004.

Course Title: Advance Computer Networks and Simulation Lab
Course Code: CSE507

L	T	P	Cr
0	0	3	2

List of Experiments:

1. Introduction to Network Simulator OPNET/NS2.
2. Simulation of Wireless data Network with different with physical characteristics.
3. Comparative investigation on Hub and Switch as Interconnecting Device for verifying performance of LAN with various applications.
4. To plan and analyze the Wireless Local Area Network using OPNET.
5. Simulation of Ad-hoc based WLAN.
6. Simulation of Cluster Topology.
7. Rapid Configuration of Wired Network (Token Ring Topology).
8. Implementation of CSMA/CD Protocol and its comparative investigation with ALOHA Protocol.
9. Implementation of CSMA/CD Protocol and its comparative investigation with ALOHA Protocol.
10. Design a Project having two scenarios: (a) Star Topology Wireless Network using rapid configuration method. (b) Ring Topology Wireless network also using rapid configuration method, Compare the performance parameters like: End to End Delay for data, Traffic Received, Queue size etc.
11. Design Wireless network using Carrier Sensing Multiple Access Technique, Check the performance parameters like: Channel Throughput, Signal to Noise Ratio etc.
12. Designs a Star shaped Wireless topology and suggest a suitable way to import traffic.

* Students are advised to use **OPNET/NS2** for above listed experiments.

This is only the suggested list of Practicals. Instructor may frame additional Practicals relevant to the course contents.

L	T	P	Credits
0	0	3	2

Course Title: Data Mining and Warehousing Lab.

Course Code: CSE509

Students are required to perform practical in Oracle/MS SQL Server and STATISTICA Data Miner

List of Experiments:

1. Building a Database Design using ER Modeling and Normalization Techniques
2. Implementation of functions, Procedures, Triggers and Cursors
3. Load Data from heterogeneous sources including text files into a predefined warehouse schema.
4. Design a data mart for a bank to store the credit history of customers in a bank .Use this credit profiling to process future loan applications.
5. Feature Selection and Variable Filtering (for very large data sets)
6. Association mining in large data sets
7. Interactive Drill-Down, Roll up, Slice and Dice operations
8. Generalized EM & k-Means Cluster Analysis
9. Generalized Additive Models (GAM)
10. General Classification and Regression Trees (GTrees)
11. General CHAID (Chi-square Automatic Interaction Detection) Models
12. Interactive Classification and Regression Trees

Course Title: Digital Image Processing
Course Code: CSE502

L	T	P	Credits
3	0	0	3

Course Objective: This course provides an introduction to basic concepts, methodologies and algorithms of digital image processing focusing on the following two major problems concerned with digital images: (1) image enhancement and restoration for easier interpretation of images, and (2) image analysis and object recognition. Some advanced image processing techniques (e.g., wavelet and multi resolution processing) will also be studied in this course. The primary goal of this course is to lay a solid foundation for students to study advanced image analysis topics such as computer vision systems, biomedical image analysis, and multimedia processing & retrieval.
Learning Outcomes: To understand (i.e., be able to describe, analyze and reason about) how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation.

UNIT-A

Digital Image Fundamentals: Why is Computer Vision Difficult? Different stages of image processing and analysis, Components of image processing system, Sampling and Quantization, Some basic relationships like neighbour's connectivity, distance measure between pixels.
Image Enhancement and Restoration: Basic Intensity Transformation Functions, Histogram processing, Spatial Domain methods: Fundamentals of spatial filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Frequency domain methods: low pass filtering, high pass filtering, Image Degradation/Restoration model

14Hours

UNIT-B

Image Compression: Fundamentals of image compression, error criterion, Coding Inter-pixel and Psycho visual redundancy, Image Compression models, Error free compression: Huffman, Arithmetic, Run length Coding, Lossy Compression: Block Transform Coding based on DCT and DWT.
Morphological image processing: Basic Morphology concepts, Binary dilation and erosion, Opening and Closing operations, Basic Morphological Algorithms: Boundary extraction, Hole Filling, Extraction of Connected Components.
Color image processing Color Image-Processing Fundamentals, RGB Models, HSI Models, and Relationship between Different Models.

14Hours

UNIT-C

Image Segmentation and Edge Detection: Fundamentals, Point, Line and Edge Detection: Detection of isolated points, lines, Basic Edge Detection, Advanced Edge detection using canny edge detector, Laplacian edge detector and Laplacian of Gaussian edge detector. Edge Linking and Boundary Detection, Thresholding: Basic Global Thresholding and Optimum Global Thresholding using Otsu's Method, Region Based Segmentation: Region Growing, Region Splitting and Merging.
Representation and Description: Representation schemes like chain coding, Polygonal approximation using minimum perimeter polygon, Signatures, Boundary Descriptors: Shape Numbers, Fourier, and Statistical moments. Regional Descriptors: Topological Descriptors, Texture, Moment Invariants

12Hours

UNIT-D

Recognition and Interpretation: Pattern and pattern classes, Decision Theoretic methods: minimum distance classifier, matching by correlation, Structural Methods: Matching Shape Numbers.

Applications of Image Processing: Study and Analysis of applications of Image processing in different fields i.e. Information Security, Bioinformatics, Medical Science etc. Develop one application using a standard tool.

12Hours

REFRENCES:

1. Digital Image Processing By Rafael C.Gonzales, Richard E. Woods, Pearson Education.
2. Digital Image Processing and Computer Vision by Sonka, Hlavac, Boyle Cengage Learning
3. Fundamentals of Digital Image Processing By Jain, Pearson Education
4. Digital Image Processing and Analysis by Chanda & Majmuder, PHI
5. Digital Image Processing by W. K. Pratt, John Wiley
6. Pattern Classification, Duda, R.D. and Hart, P.E., Stork, D. G.

Course Title: Digital Image Processing Lab
Course Code: CSE540

L	T	P	Credits
0	0	2	1

Students are required to perform practical is MATLAB 7.0 or higher version

List of Experiments:

- Lab 1: Write a program for image enhancement
- Lab2: Write a program for image compression
- Lab3: Write a program for color image processing
- Lab4: Write a program for image segmentation
- Lab 5: Write a program for image morphology
- Lab 6: Write a program for Image Restoration
- Lab 7: Write a program for Edge detection
- Lab 8: Write a program for Blurring 8 bit color versus monochrome

Discipline Specific Electives

Course Title: Information Security & Risk Management
Course Code: CSE508

L	T	P	Credits
4	0	0	4

Course Objective: The aim of this course is to provide attendees with a thorough understanding of the issues associated with the design, provision and management of security services for modern communication and information systems. Students will learn the different aspects of information and network security and you will be able to speak about a multitude of security attacks and the defensive strategies used to combat them.
Learning Outcomes: After completing this course the student should be able to: Describe the fundamental concepts of information system security. Understand the following terms: security policy, host based security, firewall, and packet filtering and intrusion detection. Use various software tools to analyze network and host vulnerabilities.

UNIT-A

Overview: Services, Mechanisms, and Attacks, the OSI Security Architecture, a Model for Network Security.
Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography.
Block Ciphers And The Data Encryption Standard: Simplified DES, Block Cipher Principles, The Data Encryption Standard, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.
Introduction To Finite Fields: Groups, Rings, and Fields, Modular Arithmetic, Euclid's Algorithm, Finite Fields of the Form GF(p), Polynomial Arithmetic, Finite Fields of the Form GF(2n).

14Hours

UNIT-B

Advanced Encryption Standard: Evaluation Criteria for AES, The AES Cipher.
Contemporary Symmetric Ciphers: Triple DES, Blowfish, RC5, Characteristics of Advanced Symmetric Block Ciphers, RC4 Stream Cipher.
Confidentiality Using Symmetric Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation.
Public-Key Encryption and Hash Functions: Introduction to Number Theory: Prime Numbers, Format's and Euler's Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms.
Public-Key Cryptography and RSA: Principles of Public-Key Cryptosystems, the RSA Algorithm, Recommended Reading and Web Site, Key Terms, Review Questions, and Problems.
Key Management and Other Public-Key Cryptosystems: Key Management, Diffie Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

14Hours

UNIT-C

Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions and MACs.
Hash Algorithms: MD5 Message Digest Algorithm, Secure Hash Algorithm, RIPEMD-160, and HMAC.
Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standard.

14Hours

UNIT-D

Network Security Practice: Authentication Applications: Kerberos, X.509 Authentication Service, Electronic Mail Security: Pretty Good Privacy, S/MIME.
IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management, Web

Security: Web Security Considerations, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

System Security: Intruders: Intruders, Intrusion Detection, Password Management, Malicious Software: Viruses and Related Threats, Virus Countermeasures, Firewalls: Firewall Design Principles, Trusted Systems.

14Hours

REFERENCES:

1. William Stallings, "Cryptography and network Security", Pearson Education 2003.
2. Trappe & Washington, "Introduction to Cryptography with Coding Theory", Prentice-Hall 2001
3. D Stinson, "Cryptography: Theory and Practice", Second Edition Chapman & Hall 2002.
4. Kaufman, Perlman, and Speciner, "Network Security", Prentice-Hall Second Edition 2001.
5. Michael E. Whitman, "Principles of information Security", Cengage Learning, New Delhi

Course Title: Software Metrics and Quality Engineering
Course Code: CSE504

L	T	P	Credits
4	0	0	4

Course Objectives: This course aims to give students a theoretical foundation in software engineering. Students will learn about the principles and methods of software engineering, including current and emerging software engineering practices and support tools.
Learning outcomes: This course offers a good understanding of the concepts, methods and techniques of software testing and quality assurance and prepares students to be in a position to develop error free and quality software.

UNIT-A

Introduction to Software Engineering, System Engineering Vs. Software Engineering, Software Evolution, Software Characteristics, Cost of Software Production, Software Components, Crisis – Problem and Causes, Challenges in Software Engineering. Software Process Models: SDLC, Waterfall Model, Incremental Model, Prototyping Model, Evolutionary Model, Spiral Model, Rapid Application Development Model, Formal Methods, Open Source Development, Object Oriented Life Cycle Model.

14Hours

UNIT-B

Project Management Concepts: Management Activities, Project Planning, Project Scheduling, Size Estimation – LOC, FP; Cost Estimation Models –COCOMO, COCOMO-II. Software Requirements Analysis and Specification Concepts: Requirement Engineering, Requirement Elicitation Techniques, Requirements Documentation, Characteristics and Organization of SRS

14Hours

UNIT-C

Software Design and Coding Concepts: Design Principles, Data Design, Architectural design, Interface Design, Component Level Design, Object Oriented Design Concepts, Cohesion and Coupling and their classification, top-down, bottom-up and middle-out design, Coding,CodingStandards,Coding,Conventions,ProgrammingStyle.VerificationandValidation Process,DesignofTestCases,SoftwareTestingStrategies,Testing,IntegrationTesting,Top Down and Bottom Up Integration Testing, Alpha & Beta Testing, System Testing and Debugging.
Software Quality Assurance Concepts and Standards : Quality Concepts, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Formal Technical Reviews, Review Guidelines, Software Reliability, Software Safety, Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126 Quality Factors, CMM, TQM, Six Sigma, SPICE, Software Quality Assurance Metrics

14Hours

UNIT-D

Technical Metrics for Software: Software Measurements: What and Why, A Framework for Technical Software Metrics, Metrics for the Analysis Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Software Quality, Metrics for Maintenance. Software Quality Metrics: Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points , In-Process Quality Metrics: Defect Arrival Pattern, CASE (Computer Aided Software Engineering) and Introduction to UML: CASE and its Scope, Building blocks of CASE, CASE Tools, CASE Environment

14Hours

REFERENCES:

1. Ian Sommerville: Software Engineering, Seventh Edition, Pearson Education.
2. R.S. Pressman: Software Engineering: A Practitioner's Approach, Sixth Edition and McGraw Hill.
3. S.L. Pfleeger, J.M. Atlee: Software Engineering: Theory and Practice, Second Edition, Pearson Education.
4. Douglas Bell: Software Engineering for Students, Fourth Edition, Pearson Education.
5. PankajJalote: An Integrated Approach to Software Engineering, Second Edition, Narosa.
6. K.K. Aggarwal, Yogesh Singh: Software Engineering, Second Edition, New Age International.

Course Title: PATTERN RECOGINATION & ANALYSIS
Course Code: CSE530

L	T	P	Credits
4	0	0	4

Course Objectives: To impart knowledge of pattern recognition and machine learning theories**,** design and implement certain important pattern recognition techniques**,** apply the pattern recognition theories to applications of interest**,** implement the entropy minimization, clustering transformation and feature ordering

Learning Outcomes: Students will be able to learn fundamental concepts of image processing. Learning different image enhancement techniques. To Understand and review image transforms and Analyze the basic algorithms used for image processing & image compression with morphological image processing.

UNIT-A

Introduction Feature extraction and Pattern Representation, Concept of Supervised and Unsupervised Classification Introduction to Application Areas

Statistical methods for Pattern Recognition Bayes Decision Theory, Minimum Error and Minimum Risk Classifiers, Discriminant Function and Decision Boundary ,Normal Density, Discriminant Function for Discrete Features ,Parameter Estimation

14Hours

UNIT-B

Dimensionality Dimension and accuracy**,** Computational Complexity**,** Dimensionality Reduction Fisher Linear Discriminant, Multiple Discriminant Analysis

Nonparametric density estimation Density Estimation, Nearest Neighbour Rule, Fuzzy Classification

12Hours

PART-C

Linear Models for Classification and Regression. Separability,Two Category and Multi Category Classification, Linear Discriminators, Perceptron Criterion, Relaxation Procedure, Minimum Square Error Criterion Widrow-Hoff Procedure,Ho-Kashyap Procedure Kesler's Construction

Neural Network based Classifiers Single and Multilayer Perceptron**,** Back Propagation Learning Hopfield Network, Fuzzy Neural Network

14Hours

UNIT-D

Time serving Pattern Recognition model First Order Hidden Markov Model**,** Evaluation, Decoding Learning

Unsupervised Classification techniques Clustering Hierarchical Clustering Graph Based Method Sum of Squared Error Technique Iterative Optimization

12Hours

REFERENCES:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", John Wiley & Sons, 2001.
2. Earl Gose, Richard Johsonbaugh and Steve Jost, "Pattern Recognition and Image Analysis", Prentice Hall, 1999

Course Title: DISTRIBUTED DATABASES

L	T	P	Credits
4	0	0	4

Course Code: CSE552

Course Objectives: To introduce advanced concepts of transaction management and recovery techniques. To impart knowledge related to query processing and query optimizer phases of a distributed database management system

Learning Outcomes: Students will be able to Explain and understand the concept of a transaction and how ACID properties are maintained when concurrent transaction occur in a distributed database, Organize strategic data in an enterprise and build a data Warehouse

UNIT-A

Introduction: Features of Distributed versus Centralized Databases, Principles Of Distributed Databases , Levels Of Distribution Transparency, Reference Architecture for Distributed Databases , Types of Data Fragmentation, Integrity Constraints in Distributed Databases. Translation of Global Queries to Fragment Queries, Equivalence Transformations for Queries, Transforming Global Queries into Fragment Queries, Distributed Grouping and Aggregate Function Evaluation, Parametric Queries.

12Hours

UNIT-B

Distributed Database Optimization: Optimization of Access Strategies, A Framework for Query Optimization, Join Queries, and General Queries. The Management of Distributed Transactions, A Framework for Transaction Management, Supporting Atomicity of Distributed Transactions, Concurrency Control for Distributed Transactions, Architectural Aspects of Distributed Transactions. Concurrency Control, Foundation of Distributed Concurrency Control, Distributed Deadlocks, and Concurrency Control based on Timestamps, Optimistic Methods for Distributed Concurrency Control.

12Hours

UNIT-C

Reliability and Transaction Management: Reliability, Basic Concepts, No blocking Commitment Protocols, Reliability and concurrency Control, Determining a Consistent View of the Network, Detection and Resolution of Inconsistency, Checkpoints and Cold Restart, Distributed Database Administration, Catalog Management in Distributed Databases, Authorization and Protection. Architectural Issues, Alternative Client/Server Architectures, Cache Consistency Object Management, Object Identifier Management, Pointer Swizzling, Object Migration, Distributed Object Storage, Object Query Processing, Object Query Processor Architectures, Query Processing Issues, Query Execution , Transaction Management, Transaction Management in Object DBMSs , Transactions as Objects.

12Hours

UNIT-D

Integrity and Recovery: Database Integration, Scheme Translation, Scheme Integration, Query Processing Query Processing Layers in Distributed Multi-DBMSs, Query Optimization Issues. Transaction Management Transaction and Computation Model Multidatabase Concurrency Control, Multidatabase Recovery, Object Orientation and Interoperability Object Management Architecture CORBA and Database Interoperability Distributed Component Model COM/OLE and Database Interoperability, PUSH-Based Technologies.

12Hours

REFERENCES:

1. Principles of Distributed Database Systems, M.Tamer Ozsu, Patrick Valduriez – Pearson Education.
2. Distributed Database Principles & Systems, Stefano Ceri, Giuseppe Pelagatti McGraw-Hill

Course Title: Artificial Intelligence

Course Code: CSE554

L	T	P	Credits
4	0	0	4

Course Outline: To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements. To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems.

Learning Outcomes: Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search based techniques to solve them. Formulate and solve problems with uncertain information using Bayesian approaches.

UNIT-A

Introduction: Foundations of artificial intelligence (AI), History of AI, Basics of AI, Artificial Intelligence Problems, Artificial Intelligence Techniques Problem Spaces and Search : Defining the problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in designing search problems, Breadth first search (BFS), Depth first search (DFS), Bi-directional Search

12Hours

UNIT-B

Informed Search Strategies: Best first search, A* algorithm, Heuristic functions, Generate and Test, Hill Climbing, Simulated Annealing, Constraint satisfaction

12Hours

UNIT-C

Knowledge Representation: Representations & mappings, Approaches in knowledge representation, Issues in knowledge representation, Predicate logic, Propositional logic, Procedural versus declarative knowledge, Logic programming, Forward versus backward reasoning

Symbolic reasoning under uncertainty: Non monotonic reasoning, Logic for non-monotonic reasoning, Implementation issues, augmenting a problem solver, Truth maintenance system

Statistical reasoning: Certainty factors & rule-based systems, Probability & Bayes' theorem, Bayesian networks, Dempster-Shafer-Theory

12Hours

UNIT-D

Weak slot and filler structures: Semantic nets, Frames

Strong slot and filler structures: Conceptual dependency, Scripts

Game playing: The min-max search procedure, Alpha-beta cutoffs, Iterative deepening

Advance topics in Artificial Intelligence: Artificial Neural Network, Fuzzy logic systems, Genetic algorithms, Natural Language Processing (NLP)

12Hours

REFERENCES:

1. Rich E., Artificial Intelligence, Tata McGraw Hills (2009) 3rded.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education Asia (2009) 6th Ed.
3. Patterson D.W, Introduction to AI and Expert Systems, Mc GrawHill (1998), 1st Ed.
4. ShivaniGoel, Express Learning- Artificial Intelligence, Pearson Education Asia (2013), 1st Ed.

Course Tile: Wireless Data Networks
Course Code: CSE506B

L	T	P	Credits
4	0	0	4

Course Objective: This course is designed to provide the students with a basic understanding and experiential learning of wireless communications and networking.
Learning Outcomes: After the completion of this course the participants would gain the knowledge of how a Wireless networks work during data communication between wireless end points and how to implement the Security on it.

PART-A

Introduction: Differences between wireless and fixed telephone networks, Evolution of wireless networks, Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems, Comparison of common Wireless Communication systems, Traffic routing in wireless networks: circuit switching and packet switching.
GSM: Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

14 Hours

PART-B

Wireless Local Area Networks: Introduction, WLAN topologies, requirements, working and function of physical layer and MAC layer, IEEE standards for wireless networks, Wi-Fi, Bluetooth, WiMax.

14 Hours

PART-C

Wireless Internet: Mobile IP components, process of agent discovery, registration and de-registration, care-of-address, concept of tunneling, Limitations of Mobile IP, introduction to micro-mobility protocols.
Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

14 Hours

PART-D

Ad Hoc Wireless Networks: Introduction, Challenges in ad hoc networks: spectrum allocation, media access, routing, multicasting, energy efficiency, security and privacy; problems in ad hoc channel access, receiver-initiated MAC protocols, sender-initiated MAC protocols and existing ad hoc MAC protocols; Ad hoc routing protocols: Destination sequenced distance vector (DSDV), Ad hoc on demand distance vector routing (AODV), Dynamic source routing (DSR), Temporally ordered routing algorithm (TORA).

14 Hours

REFERENCES:

1. Pahlavan and Krishnamurthy," Principles of Wireless Networks", Prentice Hall, 2002.

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2. Schiller J," Mobile Communications", Addison-Wesley, 2000.
3. Jerry D. Gibson," The Mobile Communications Handbook", CRCPress, 1999.
4. G.Held," Data over Wireless Networks", McGraw-Hill, 2001.
5. Blake, "Wireless Communication Systems", Cengage Learning, New Delhi

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Course Title: AGILE SOFTWARE DEVELOPMENT APPROACHES

L	T	P	Credits
4	0	0	4

Course Code: CSE534

PART A

Agile Software Development: Basics and Fundamentals of Agile Process Methods, Values of Agile, Principles of Agile, stakeholders, Challenges

Lean Approach: Waste Management, Kaizen and Kanban, add process and products add value. Roles related to the lifecycle, differences between Agile and traditional plans, differences between Agile plans at different lifecycle phases. Testing plan links between testing, roles and key techniques, principles, understand as a means of assessing the initial status of a project/ How Agile helps to build quality

PART B

Agile and Scrum Principles: Agile Manifesto, Twelve Practices of XP, Scrum Practices, Applying Scrum. Need of scrum, working of scrum, advanced Scrum Applications, Scrum and the Organization, scrum values

Agile Product Management: Communication, Planning, Estimation Managing the Agile approach Monitoring progress, Targeting and motivating the team, managing business involvement, Escalating issue. Quality, Risk, Metrics and Measurements, Managing the Agile approach Monitoring progress, Targeting and motivating the team, Managing business involvement and Escalating issue.

PART C

Agile Requirements: User Stories, Backlog Management. Agile Architecture: Feature-Driven Development. Agile Risk Management: Risk and Quality Assurance, Agile Tools

Agile Testing: Agile Testing Techniques, Test-Driven Development, User Acceptance Test

Agile Review: Agile Metrics and Measurements, the Agile approach to estimating and project variables, Agile Measurement, Agile Control: the 7 control parameters. Agile approach to Risk, The Agile approach to Configuration Management, The Atern Principles, Atern Philosophy, The rationale for using Atern, Refactoring, Continuous integeration, Automated Build Tools.

PART D

Scaling Agile for large projects: Scrum of Scrums, Team collaborations, Scrum, Estimate a Scrum Project, Track Scrum Projects, Communication in Scrum Projects, Best Practices to Manage Scrum.

REFERENCES:

1. Robert C. Martin, *Agile Software Development, Principles, Patterns, and Practices,*Pearson Education, 3rd Edition, 2011
2. Martin Fowler, *Refactoring: Improving the Design of Existing Code*, 1st Edition, 2005

DAV UNIVERSITY, JALANDHAR

L	T	P	Credits
4	0	0	4

Course Title: Bioinformatics
Course Code: CSE532

Objective To impart knowledge of Bioinformatics, Scope of Bioinformatics, Types of Databases and their use, Pairwise and Sequence alignment, Predictive methods, Drug discovery and Applications Of Image Processing In Biomedical.

PART-A

Introduction Important contributions - sequencing development - aims and tasks of Bioinformatics -applications of Bioinformatics - challenges and opportunities
Databases Importance of databases - nucleic acid sequence databases - protein sequence data bases - structure databases - Bibliographic databases and virtual library - specialized analysis packages

14 Hours

PART-B

Sequence Alignment Techniques Sequence analysis of biological data- models for sequence analysis and their biological motivation- methods of alignment - methods for optimal alignments; using gap penalties and scoring matrices- multiple sequence alignment – introduction - tools for MSA - application of multiple sequence alignment.

10 Hours

PART-C

Predictive Methods Using DNA and Protein Sequences Gene predictions strategies - protein prediction strategies – molecular visualization-Homology - phylogeny and evolutionary trees - Homology and similarity - phylogeny and relationships.

14 Hours

PART-D

Bio Image Processing Micro-array Analysis; DNA chip image analysis, 3D gene expression characterization, the dynamical evolution of biological shapes, and dynamic systems models, Image Processing Software (UT Image Tool, IfranView, R, MatLab, NIH-J, etc)

8 Hours

REFERENCES:

1. T K Attwood, D J parry-Smith, *Introduction to Bioinformatics*, Pearson Education, 1st Edition, 11th Reprint 2005.
2. C S V Murthy, *Bioinformatics*, Himalaya Publishing House, 1st Edition 2003
3. Stephen A. Krawetz, David D. Womble, *Introduction To Bioinformatics A Theoretical and Practical Approach*, Humana Press, 2003.
4. Hooman H. Rashidi, Lukas K. Buehler, *Bioinformatics Basics-Applications in Biological Science and Medicine*, CRC press, 2005.

DAV UNIVERSITY, JALANDHAR

Course Title: DISTRIBUTED COMPUTING SYSTEMS

L	T	P	Credits
4	0	0	4

Course Code: CSE518

Course Objective: The course is intended to provide basic foundation with fundamental concepts and mechanisms of distributed computing systems. Most of the issues discussed in this course material are the essence of advanced operating systems. Broad coverage as: Introduction to distributed computing systems (DCS) DCS design goals, Transparencies, Fundamental issues, Distributed Coordination, Process synchronization, Inter-process communication.

Learning Outcomes: After the completion of this course the participants would gain the knowledge of the working of the each functional and finally the student will be exposed to the recent trends in distributed computing systems and multithreaded application.

PART-A

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. **System Models**: Architectural models, Fundamental Models

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, and termination detection.

14 Hours

PART-B

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non-token based algorithms, performance metric for distributed mutual exclusion algorithms.

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

13 Hours

PART-C

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.

Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent.

Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

15 Hours

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PART-D

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to wave & traversal algorithms, Election algorithm. CORBA Case Study: CORBA RMI, CORBA services.

15 Hours

REFERENCES:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Coulouris, Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.
3. Gerald Tel, "Distributed Algorithms", Cambridge University Press
4. Nancy Lynch, Distributed Algorithms, Morgan Kaufmann.
5. Andrew S. Tanenbaum, Distributed Operating Systems, ACM Press.

DAV UNIVERSITY, JALANDHAR

Course Title: Advanced Data Structures and Algorithms
Course Code: CSE528

L	T	P	Credits
4	0	0	4

Course Objective: To impart knowledge of Data Structure and How to design algorithms to solve different types of problems and to differentiate linear and nonlinear data structure.

Learning outcomes:-After completion of this course, student will be able to explain data structure, its scope in computer science and students will be able to find the best solution for logical and mathematical problems.

PART-A

Review of Basic Concepts: Abstract data types, Data structures, Algorithms, Big Oh, Small Oh, Omega and Theta notations, solving recurrence equations.

Advanced Search Structures: Splay trees, 2-3 trees, 2-3-4 trees, Red-black trees, and Randomized structures, Skip lists, Treaps, Universal hash functions

14 Hours

PART-B

Advanced Structures for Priority Queues and Their Extensions: Binomial heaps, Leftist heaps, skewed heaps, Fibonacci heaps and its amortized analysis, Applications to minimum spanning tree algorithms

Divide and Conquer Techniques – Review of quick sort, merge sort and selection sort with their average case analysis, Convex Hull, Efficient multiplications (complex numbers, n-bit numbers, square matrices)

14 Hours

PART-C

Greedy Methods – Minimum spanning tree, Kruskal's and Prim's algorithm

Dynamic Programming - Single-source shortest path Algorithms, All-pairs shortest path algorithms

Graph Algorithms- DFS, BFS, Bipartite graphs, finding diameter of a tree efficiently, Disjoint Graphs, Connected Components, Articulation Points, Biconnected components

14 Hours

PART-D

String Matching Algorithms:

Introduction, The Brute-Force- Algorithm, Rabin-Karp Algorithm, String Matching with Finite automata, Knuth-Marries-Pratt Algorithm

Multimedia Structures:

Segment trees, k-d trees, Point Quad trees

14 Hours

REFERENCES:

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Galgotia, 1999.
2. Adam Drozdex, Data Structures and algorithms in C++, Second Edition, Thomson learning – vikas publishing house, 2001.
3. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.

Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, "Introduction to Algorithms", PHI.

DAV UNIVERSITY, JALANDHAR

Course Title: Wireless Data Networking Lab
Course Code: CSE524

L	T	P	Credits
0	0	2	1

List of Experiments:

1. Design an 802.11 network of mesh topology, using set of suitable inputs check the performance parameters like: Battery Energy consumed, Bit error Rate, Busy, Signal to Noise ratio, Throughput, Utilization
2. Design Wireless network using Carrier Sensing Multiple Access Technique, Check the performance parameters like: Channel Throughput, Signal to Noise Ratio etc.
3. Design a Star shaped Wireless network, and suggest a way to configure a Physical layer of selected nodes.
4. To plan and analyze the Wireless Local Area Network using OPNET.
5. Simulation of Ad-hoc based WLAN
6. Create a radio network and observe variations in the quality of received signal that results from radio noise at the receiving node in a dynamic network topology.
7. Develop of a new CDMA based MAC on top of 802.11p Physical layer.
8. Design a Project having two scenarios: (a) Bus Topology Wireless Network (b) Ring Topology Wireless network makes use of the Web Reporting to compare the result of two different scenarios.
9. Designs a suitable Wireless Sensor Network and suggest a way to import traffic.
10. Designs a suitable Wireless Sensor Network and suggest a way to export traffic.
11. Design the Wireless Sensor Network to re-organize the sensor nodes.
12. Optimize the wireless Sensor Network to determine the energy efficiency by creating more than one scenario.
13. Develop two or more Wireless Sensor Network scenarios to model the lifetime maximization.

* Students are advised to use **OPNET/NS2** for above listed experiments.
   a. This is only the suggested list of Practicals.
   b. Instructor may frame additional Practicals relevant to the course contents.

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Course Title: AGILE SOFTWARE DEVELOPMENT APPROACHES

Course Code: CSE542

L	T	P	Credits
0	0	2	1

Laboratory Work: Exploring the tools (e.g. Agilefant) related to Agile Development and approaches and develop small projects using this technology.

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Course Title: BIOINFORMATICS LAB
Course Code: CSE538

L	T	P	Credits
0	0	2	1

List of Experiments:

1. Browsing Genomic databases using Map Viewer & ensembl, viewing genetic, linkage maps for human and other model organisms.
2. Browsing Human genome data, OMIM, SNP databases to understand genetic and metabolic disorders at least 2 each
3. Browsing genomic resources for plant, yeast genomes
4. Browsing resources for microbial and viral genomes
5. Mining genomic data to identify genomic features: codon usage, repeats, reversals, Homologous regions, operon structures, syntenic regions, horizontal gene transfer
6. Gene prediction algorithms for Prokaryotes
7. Gene prediction algorithms for Eukaryotes
8. Structural databases: revise pdb, ndb, ccsd.
9. Evaluation of 3D structure of proteins: Procheck, Ramachandran plot, ProsaII plot
10. Explore: Derived databases of structures: DSSP, FSSP, CATH & SCOP
11. Prediction of secondary structures of proteins: at least 3 methods for 3 proteins
12. Prediction of Tertiary structure fo proteins: SwissModel and Modeller
13. Exploring metaservers for 2D and 3D structure prediction Calculation of MCC & rmsd
14. Identifying fold of proteins Use of threading servers: Phyre etc
15. Energy minimisation & geometry optimization for proteins & peptides
16. Using servers for function annotations: Evolutionary trace method etc.
17. Write a program to Convert DNA sequence into RNA sequence.
18. Write a program to get anti-parallel and complementary strand of a given DNA strand.
19. Write a program to join two different sequences of a given DNA.
20. Write a program to open NCBI database file by File-handle.
21. Write a program to count the bases present in DNA molecule.

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Course Title: Distributed Computing System Lab

Course Code: CSE548

L	T	P	Credits
0	0	2	1

List of Experiments:

RPC Programming

1. Implement PI calculation Service
2. Implement Calculator Service using SUN RPC.
3. Implement RPC programming on windows using DCOM.

RMI Programming

1. Implementation of "Hello Word" Service using JAVA RMI
2. Implementation of "Calculator" Service using JAVA RMI
3. Implement RMI –IIOP Programming.

Thread Programming in Java

1. Write an application that executes two threads. One thread display "HELLO WOLD" every 1000 milliseconds and another thread display "How Are You" every 2000 milliseconds. Create the threads by implementing Runnable interface.
2. Implement Multithreaded Echo server using Socket.
3. Implement producer consumer example.
4. Mobile Agent (IBM's Aglet) Programming
5. Implement CORBA File
6. Incrementing a counter in shared memory. Tools/ Apparatus: Unix/Linux C Programming Environment
7. Implement Network File System (NFS)
8. Creation of A BPEL (Business Process Execution Language) Module and a Composite Application
9. Web Service Programming

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Course Title: Advanced Data Structures and Algorithms Lab

Course Code: CSE536

L	T	P	Credits
0	0	2	1

Course Objective: To impart practical knowledge about various data structures and algorithms to students

Learning outcomes:-After completion of this course, student will be able to apply various data structures and algorithms for various problems

List of Experiments:

1. Implementation of 2-3 trees and 2-3-4 trees
2. Implementation of Fibonacci heaps
3. Implementation of quick sort, merge sort and heap sort
4. Implementation of Kruskal's and Prim's algorithm
5. Implementation of Dijkstra's algorithm
6. Implementation of Brute-Force- Algorithm and Rabin-Karp Algorithm

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Course Title: NETWORK SECURITY
Course Code: CSE520

L	T	P	Credits
4	0	0	4

Course Objective: The objective of this course is to gain an understanding of various methods, and protocols used in network security.
Learning Outcomes: After the completion of this course the participants would gain the knowledge of various protocols of networking, security issues and password authentication protocols.

PART-A

Overview of computer networks, seven-layer architecture, TCP/IP suite of protocols. Introduction to information Security, Types of information security controls, need of Information Security, Allocation of information security responsibilities, Security mechanisms, Identification of Security threats and their effects on security, Technologies and Security policies, real time Communication security.
An introduction to LAN/WAN Security and internet Security, Security Management for the World Wide Web and Internet firewalls and how to get past the firewall, Steganography, Layers and Cryptography.

PART-B

Overview of Authentication schemes: Password and address based Authentication, Cryptographic Authentication protocols, Trusted Intermediaries and session key establishment.
Authentication of people: Passwords, Online and offline password guessing, eavesdropping, password and careless users, authentication tokens and biometrics.

PART-C

Security handshake pitfalls: Mutual authentication, Integrity for data, Mediated Authentication, Strong password protocols: EKE, SRP, SPEKE and PDM.

Public key infrastructure (PKI): Terminology, PKI trust models, Revocation and Authorization futures.
IPsec: Overview of IPsec, IP and IPv6, AH and ESP, IKE, SSL/TLS.

PART-D

Overview of IT Security, Hacking, Hackers and Types of Hackers, Attacks, Denial of Service Attacks (DoS), types of DOS attacks, Viruses and their characteristics, impact they can have on operations and business, Detection and Prevention Mechanisms, types of virus, The self-Hack Audit, VPN.
Intrusion: Intruders, Audit records, Intrusion detection, distributed intrusion detection, honeypots.
Electronic Mail Security: PEM, Structure of PEM Message and S/MIME, PGP etc.

REFERENCES:

1. Charlie Kaufman, Radia Perlman, Mike Speciner," Network Security", Pearson Education, 2006.

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2. S. Cimato and C. Galdi, "Security in Communication Networks", Springer, 2003.
3. H. Chan and V. Gligor, "Information Security", Springer, 2002.
4. UPTEC Computer Consultancy Limited, "Information Technology Tools and Applications", ELSEVIER2005.
5. Rajaraman, "Introduction to Information technology", Prentice Hall of India, Ed., 2005.
6. Thomas II, "Network Security", Pearson Education, 2005.

DAV UNIVERSITY, JALANDHAR

Course Title: Unified Software Configuration Management
Course Code: CSE542

L	T	P	Credits
4	0	0	4

Course Objective: This course should provide the students with a fairly good concept defining software configuration, how it is maintained and controlled until the software is retired.

Learning Outcomes: After the completion of this course the students understand similarities and differences between models and know when to use them and also learn designing techniques appropriate for each model.

Part-A

Software Configuration Management

SCM best practices, SCM tools and process, dyeing with changing project requirements.

Overview of the Unified Change Management Model

UCM, Clear Case, UCM process overview, defining the Implementation Model, The UCM baseline and Change Model.

13 Hours

Part-B

Functional Overview of Objects

The Repository, Versioned Object Base, Workspaces, Component Management, Process, Building, Clear make, Derived Objects, Configuration records

Establishing the Initial SCM Environment

Clear Case Architecture Basics, Defining the Implementation Model, Creating the VOBs, Baseline promotion levels Project Management in Clear Case

15 Hours

Part-C

Coordinating Multiple Project Teams and Other Scenarios

Organizing large Multi project development efforts, Coordinating cooperating projects, Independent components, Shared components, Multiple Parallel release, Using UCM without Activity-based SCM.

Development Using the UCM Model

A Developer's perspective of UCM, joining a project, making changes, delivering changes to the project, Rebasing your development stream, \Dealing with conflicting changes.

15 Hours

Part-D

Integration, Build and Release

Software Integration, Isolation and integration, Building and Base-lining, Staging and release

10 Hours

REFERENCES:

1. Software Configuration Management Strategies and Rational Clear Case by Addison Wesley Brian A. White
2. Software Engineering a Practitioner's Approach, McGraw-Hill Roger S. Pressman

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3. The Unified Modeling Language Reference Manual, Addison Wesley James Rumbaugh, Ivar Jacobson and Grady Booch.

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L	T	P	Credits
4	0	0	4

Course Title: Machine Learning

Course Code: CSE544

Course Objective: The field of machine learning is concerned with the question of how to construct computer programs that improve automatically with experience. In recent years, many successful applications of machine learning have been developed, ranging from data-mining programs that learn to detect fraudulent credit card transactions, to autonomous vehicles that learn to drive on public highways.

Learning Outcomes: This module gives students the skills and knowledge to understand how to formulate machine learning problems corresponding to different applications.

PART-A

Introduction: Well-Posed Learning Problems, Designing a Leaning System, Perspectives and Issues in Machine Learning.

Concept Learning and the General-to-Specific Ordering: Introduction, A Concept Learning Task, Concept Learning as Search, FIND-S: Finding a Maximally Specific Hypothesis, Version Spaces and the CANDIDATE-ELIMINATION Algorithm

14 Hours

PART-B

Decision Tree Learning: Introduction, Decision Tree Representation, Appropriate problem for Decision tree Learning, The Basic Decision Tree Learning Algorithm, Hypothesis Space Search in Decision Tree Leaning, Inductive Bias in Decision Tree Leaning, Issues in Decision Tree Leaning.

Artificial Neural Networks: Introduction, Natural Network Representations, Appropriate Problems for Neural Network Learning, Perceptions, Multilayer Network and the BACKPROPAGATION Algorithm.

14 Hours

PART-C

Bayesian Learning: Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Bayes Optimal Classifier, Native Bayes Classifier, An Example: Learning to Classify Text.

Instance- Based Learning: Introduction, K-NEAREST NEIGHBOUR Learning, Distance-Weighted NEAREST NEIGHBOUR Algorithm.

Genetic Algorithms: Motivation, Genetic Algorithms, Hypothesis Space Search, Genetic Programming, Parallelizing Genetic Algorithms.

12 Hours

PART-D

Learning Sets of Rules: Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First-Order Rules, Learning Sets of First-Order Rules: FOIL, Induction as Inverted Deduction, Inverted Resolution.

Support Vector Machine: Maximum margin linear separators, Quadratic Programming Solution to finding maximum margin separators, Kernels for learning non-linear functions.

15 Hours

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REFERENCES:

1. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, 2004.
2. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.
3. Richard O. Duda, Peter E. Hart & David G. Stork, "Pattern Classification. Second Edition", Wiley & Sons,.
4. Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: An introduction", MIT Press, 1998.

5. Nils J. Nilsson Introduction to Machine Learning.

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Course Title: Cloud Computing
Course Code: CSE546

L	T	P	Credits
4	0	0	4

Course Objective: Analyze the components of cloud computing showing how business agility in an organization can be created. Compare and contrast the economic benefits delivered by various cloud models based on application requirements, economic constraints and business requirements.
Learning Outcomes: This module gives students the skills and knowledge to understand how Cloud Computing Architecture can enable transformation, business development and agility in an organization. .

PART-A

Cloud Computing : Overview, Applications, Intranet and the Cloud, First Movers on the cloud, the need for Cloud Computing, Benefits of cloud Computing, Limitations of the Cloud Computing, security concerns and regulatory issues, over view of different cloud computing applications which are implemented, Business case for implementing a Cloud.

14 Hours

PART-B

Cloud Computing Technologies: Hardware and Infrastructure: Clients, Security, Network, services
Accessing the Clouds: Platforms, WEB applications, WEB APIS, WB Browsers
Cloud Storage: Overview, Storage provides, Cloud Standards: Applications, Client, Infrastructure, Services.

13 Hours

PART-C

Cloud Computing Mechanisms: Software as a service: Overview, Driving Forces, Company offerings,
Industries, Software + services: Overview, Mobile Device Integration, Providers, Microsoft Online
Application development: Google, Microsoft, Intuit Quick base, Cast Iron Cloud, Bungee Connect,
Development Platforms: Google, Sales Force, Azure, Trouble shooting, Application management

14 Hours

PART-D

Local Clouds: Virtualization, server solutions, Thin Clients
Migrating to the clouds: Cloud services for individuals, Mid-market, and Enterprise wide, Migration, best practices, analyzing the service.

13 Hours

REFERENCES:

1. Cloud Computing a practical approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, Tata McGraw-HILL,2010 Edition

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2. Cloud Computing-web Based application that change the way you work and collaborate online, Michael Miller, Pearson Eduction,2009 Edition
3. Cloud Computing for Dummie by Judith Hurwitz, Bloor Robin, Marcia Kaufman & Fern Halper, November 2009.

DAV UNIVERSITY, JALANDHAR

Course Title: Natural Language Processing

Course Code: CSE550

L	T	P	Credits
4	0	0	4

PART-A

(12 Hours)

Introduction to NLP: Introduction and Survey of applications, Levels of linguistic processing:
morphology, syntax, semantics
Language processors and Understanding: recognizers, transducers, parsers, generators, Language as a rule-based system, Language understanding as an inferential activity.

PART-B

(12 Hours)

Resources for NLP: Introduction to lexicons and knowledge bases.
Computational morphology: lemmatization, Part-of-Speech Tagging, Finite-State Analysis.
Syntactic Processing: Basic parsing: Top Down and Bottom Up parsing, Chart parsing, Deterministic parsing, Statistical parsing, Grammars with features, Unification Grammars, The
Lexicon.

PART-C

(12 Hours)

Semantic Interpretation: Lexical semantics, Semantics and logical form, Resolving ambiguities:
Word Sense Disambiguation, Linking syntax and semantics, Linking syntax and semantics in
restricted domains

PART-D

(12 Hours)

Context and World Knowledge: Discourse: linguistic context, Ellipsis; World knowledge, Discourse structure Conversation and co-operation, Implementing "co-operative responses",
Information Retrieval and Information

Extraction **References**

1. Allen, J. Natural language understanding, 2nd Edition, Redwood City, CA: 1994. Benjamin/Cummings.
2.Covington, M.A, Natural Language Processing for Prolog . Programmers, (1994), Prentice Hall
2. Jurafsky, D. and Martin: Speech and Language Processing, (2000), Prentice Hall
3 Gazdar, G. &Mellish, C. : Natural Language Processing in Prolog: An Introduction to Computational Linguistics,(1989), Addison Wesley

DAV UNIVERSITY, JALANDHAR

Course Title: NETWORK INTRUSION DETECTION

Course Code: CSE621

L	T	P	Credits
4	0	0	4

PART A

The state of threats against computers, and networked Systems Overview of computer security solutions and why they fail Vulnerability assessment, firewalls, VPNs Overview of Intrusion Detection and Intrusion prevention Network and host-based IDS

PART B

Classes of attackers, Kids/hackers/sophisticated groups, automated: Drones, Worms and Viruses A general IDS model and taxonomy, Signature based Solutions, Snort, Snort rules Evaluation of IDS, Cost Sensitive IDS Anomaly Detection Systems and algorithms

PART C

Network Behavior Based Anomaly Detectors (rate based) Host Based Anomaly Detectors, Software Vulnerabilities State transition, immunology, Payload Anomaly Detection Attack trees and Correlation of alerts Autopsy of Worms

PART D

Email/IM Security issues, Viruses/Spam, From signatures to thumbprints to zero-day detection Identity theft issues, Masquerade and Impersonation, Future Collaborative Security

References:

1. Paul E. E. Proctor, “The Practical Intrusion Detection Handbook”, Pearson Education 2000
2. Jack Koziol, “Intrusion Detection with Snort”,Pearson Education 2003
3. Stephen Northcutt, “Network Intrusion Detection”, Pearson Education 2002
4. Carl Endrof, “Intrusion Detection and Prevention”, Tata Mcgraw Hill 2003
5. Kerry Cox, “Managing Security with SNORT and IDS Tools”, O’Reilly ,2004

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L	T	P	Credits
4	0	0	4

Course Title: Software Project Management

Course Code: CSE603

Course Objective:

- To discuss the various aspects of project management
- To understand the tasks in software project management
- To describe the project titles in the course
- To describe the requirements of a project plan

Learning Outcomes: Upon successful completion of this module, the student will be able to understand and practice the process of project management and its application in delivering successful IT projects; evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities;

PART-A

Introduction: Project Management (PM) Fundamentals, People, Process, and Product, Technology Classic mistakes, PMI Processes, Software project phases, Organizational structures, Project charter Statement of Work (SOW)

Planning Phase: Development lifecycle models, Matching lifecycles to projects, Project plans Work Breakdown Structures

Estimation and Budgeting: Estimation, Budgeting, Project selection, NPV, ROI, Payback models

15 Hours

PART-B

Scheduling: Project network diagram fundamentals, PERT techniques, Gantt charts, Critical chain scheduling

Risk and Change Management: Risk management, Change control, More MS-Project Development Management: Team models, Requirements process, Configuration management, Software metrics, Programming languages & tools, Managing conflict and motivating, MS-Project: Assigning Resources

13 Hours

PART-C

Status reporting: Project metrics, Earned value analysis, Communications Techniques, Process Improvement, MS Project: (a) Resource leveling (b) Other views

System Test Process: Test specifications, Black box and white box testing, Test scripts, Unit and integration testing, Acceptance test specifications, Test tools, MS Project: (a) Reporting

13 Hours

PART-D

Final Phases & Other Issues: Project Recovery, Documentation, Cutover/Migration, Post Project Reviews, Closing, and MS Project: (a) Advanced features Project Success Management support, Expectations, Success metrics

14 Hours

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REFERENCES:

1. Kathy Schwalbe, “Information Technology Project Management” International Student Ed. THOMSON Course Technology
2. Cottrell M. and Hughes B., "Software Project Management", 3rd Edition, The McGraw-Hill Companies.
3. QuantumPM, “Microsoft Office Project Server 2003 Unleashed”, Pearson Education India.
4. Robert T. Futrell, Donald F. Shafer and Linda I Shafer, “Quality Software Project” Pearson India
5. Henry, J., “Software Project Management – A Real-World Guide to Success”, Addison-Wesley

DAV UNIVERSITY, JALANDHAR

Course Title: MEDICAL IMAGE ANALYSIS & VISUALIZATION
Course Code: CSE617

L	T	P	Credits
4	0	0	4

Objective To impart knowledge of Bioinformatics, Scope of Bioinformatics, Types of Databases and their use, Pairwise and Sequence alignment, Predictive methods, Drug discovery and Applications Of Image Processing In Biomedical.

PART-A

ECG: Cardiac electrophysiology, relation of electrocardiogram (ECG) components to cardiac events, clinical applications. Speech Signals: The source-filter model of speech production, spectrographic analysis of speech.
Speech Coding: Analysis-synthesis systems, channel vocoders, linear prediction of speech, linear prediction vocoders.
Imaging Modalities: Survey of major modalities for medical imaging: ultrasound, X-ray, CT, MRI, PET, and SPECT.
MRI: Physics and signal processing for magnetic resonance imaging. Guest lecture.
Surgical Applications: A survey of surgical applications of medical image processing. Guest lecture.

14 Hours

PART-B

Data Acquisition: Sampling in time, aliasing, interpolation, and quantization.
Digital Filtering: Difference equations, FIR and IIR filters, basic properties of discrete-time systems, convolution.
DTFT: The discrete-time Fourier transform and its properties. FIR filters design using windows.
DFT: The discrete Fourier transform and its properties, the fast Fourier transform (FFT), the overlap-save algorithm, digital filtering of continuous-time signals, Interpolation, noise reduction methods, edge detection, homomorphic filtering.

14 Hours

PART-C

PDFs: Introduction to random variables and probability density functions (PDFs).
Classification: Bayes' rule, detection, statistical classification
Estimating PDFs: Practical techniques for estimating PDFs from real data.
Random signals : Time averages, ensemble averages, autocorrelation functions, cross correlation functions, Random signals and linear systems, power spectra, cross spectra, Wiener filters.

14 Hours

PART-D

Image Segmentation: statistical classification, morphological operators, connected components.
Image Registration: Rigid and non-rigid transformations, objective functions. Joint entropy, optimization methods.

10 Hours

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REFERENCES:

1. Fundamentals of Medical Imaging, P. Suetens, Cambridge University Press 2002
2. Biomedical Signal and Image Processing, Najarian and Splinter, 2006
3. Biomedical Image Analysis, Rangaraj M. Rangayyan, 2004
4. Medical Imaging Signals and Systems, Jerry L. Prince, Jonathan Links, Prentice Hall, 2006
5. Medical Image Analysis, A. Dhawan, Wiley 2003
6. Foundations of Medical Imaging, Cho, Jones, Singh, John Wiley & Sons, 1993

DAV UNIVERSITY, JALANDHAR

Course Title: Grid Computing

Course Code: CSE619

L	T	P	Credits
4	0	0	4

Course Objective: This Course introduces the Grid Computing and their applications to students. This course covers the different compression standards used in business, some current technology and related issues.
Learning Outcomes: After the completion of this course the participants would gain the knowledge of the various technical and management issues regarding Grid business.

Part-A

Introduction: Fundamentals of Grid Computing, Types of resources, Problems in Grid computing, Global Distribution System for Grid Computing, Ecosystem of the Grid, Early Grid Activities.

12Hours

Part-B

Grid Architecture: Autonomic Computing, Service-Oriented Architecture and Grid, Semantic Grids, Open Grid Services Architecture (OGSA)

Grid Computing in Business: Grid-specializing vendors and niche vendors, Grid resource providers, Departmental grids, Enterprise grids, Partner grids, Open grids.

11Hours

Part-C

Grid software components: Management components, Donor software, Submission software, Distributed grid management, Schedulers, Enrolling and installing grid software, Logging onto the grid
Grid administration: Planning, Installation, Managing enrolment of donors and users, Certificate authority, Data sharing.

10Hours

Part-D

Technical and Management Issues: Building and selling Grid business case, Resource management, transition period management, Role of consultants, Risk Mitigation, Organizational security requirements
Case Study: The MCNC Enterprise Grid: Service, Customers, Financials, Resources, Location.

12Hours

REFERENCES:

1. Joshy Joseph, Craig Fellenstein," Grid Computing", IBM Press
2. Maozhen Li, Mark Baker," The Grid: Core Technologies", John Wiley & Son's Publisher
3. Ahmar Abbas ,"Grid Computing: Practical guide to technology and applications",Publisher:Charles River Media

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4. Pawel Plaszczak and Rich Wellner," Grid Computing: The Savvy Manager's Guide Morgan Kaufmann Publishers Marios D. Dikaiakos," Grid Computing", Spinger

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Course Title: Evolutionary Methods
Course Code: CSE601

L	T	P	Credits
4	0	0	4

Course Objective: The objective of this course is to provide the knowledge of genetic algorithm and computing technique like neural network, fuzzy logic etc.
Learning Outcomes: After the completion of this course the participants would gain the knowledge of how to design the genetic algorithm and its various applications.

PART-A

(12 Hours)

Principles of Evolutionary Computation and Genetics, Possible Applications, Pros and Cons. Evolutionary Computation as a Process Modeling tool and its historical perspective. Organic Evolution and Problem Solving: Biological Background. Introduction to Evolutionary Algorithms and Optimization.

PART-B

(14 hours)

Introduction to Genetic Algorithms, Representation and Fitness Evaluation, Mutation, Recombination, Selection, Conceptual Standard GA Algorithm.

PART-C

(14 hours)

Artificial Landscapes: Sphere model, Step Model, Ackley Model. Mapping Objective Function to Fitness Form, Fitness scaling. Different types of Selection and Crossover techniques, methods, Advanced operators in Genetic Search, Dominance, Diploidy and Abeyance.

PART-D

(14 Hours)

Co-evolution: Multiple populations and single-population co-evolution, Evolution of cooperation, relative and absolute fitness, engagement and gradient loss, the red queen effect. A case study of any Optimization Problem using GA Technique.

References

1. Goldberg, David E. Genetic Algorithms in Search Optimization and Machine Learning. Pearson Education.
2. Back, Thomas. Evolutionary Algorithms in Theory and Practice, Oxoford University, 1996
3. Sivanandam, S. N., and S. N. Deepa. Introduction to genetic algorithms. Springer Science & Business Media, 2007.
4. Vose, Michael D. The Simple Genetic Algorithms, Foundations and Theory. MIT Press 1999. ISBN-0-262-22058
5. Melanie Mitchell, (1996) An introduction to genetic algorithms, MIT Press
6. John Koza et al, (2003) Genetic Programming IV - Routine Human-Competitive Machine Intelligence, Morgan Kaufmann

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Generic Electives

DAV UNIVERSITY, JALANDHAR

Course Title: Soft Computing
Paper Code: CSE901

L	T	P	Cr
4	0	0	4

PART-A

(14 Hours)

Introduction of Soft Computing: Introduction to soft computing techniques, Basic concepts of fuzzy logic, Artificial neural networks and Genetic algorithm, Application areas of soft computing techniques.

NEURAL NETWORK –I (Introduction & Architecture)

Basic concepts and characteristics, artificial neuron model and terminology, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks.

PART-B

(14 Hours)

NEURAL NETWORK -II (Back propogation networks)

Various learning techniques; perception and convergence rule, Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications.

PART-C

(14 Hours)

Fuzzy Logic

Crisp sets, fuzzy sets, membership function, basic fuzzy set operations, fuzzy set properties, crisp relations, fuzzy relations, operation on fuzzy relations, fuzzy systems, crisp logic, predicate logic, fuzzy logic, fuzzy rule based system and de-fuzzification methods. Application of fuzzy systems.

PART-D

(12 Hours)

GENETIC ALGORITHM AND GENETIC MODELLING

Basic concepts, biological background, survival of the fittest, working principle, encoding techniques, fitness function, reproduction including Roulette-wheel selection, tournament selection and rank selection. Operators: Crossover techniques, mutation, inversion, deletion , duplication, Convergence.

References

1. S. Rajasekaran and G.A.V. Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, Prentice-Hall of India, 2003.
2. S.N Sivanandam, SN Deepa : Principles of Soft Computing, Wiley India, 2nd Edition
3. Yegnanarayana B : Artificial Neural Networks, Prentice Hall of India Private Ltd., New Delhi

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4. Goldberg, David E. : Genetic algorithms in search, optimization and machine learning, Latest Edition, Addison Wesley
5. James Freeman A. and David Skapura : Neural Networks - Algorithms, Applications & Programming Techniques, Addison Wesley

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Course Title: Mobile Communications
Course Code: CSE902

L	T	P	Cr
4	0	0	4

Course Objective: The objective of this course is to provide the knowledge of MOBILE computing techniques .

PART A

Introduction to Personal Communications Services (PCS): PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling. General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes.

PART B

Mobile Data Communication: WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML). Wireless Local Loop(WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

PART C

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000)vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000, Quality of services in 3G. Global Mobile Satellite Systems; case studies of the IRIDIUM and GLOBALSTAR systems.

PART D

Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.Server-side programming in Java, Pervasive web application architecture, Device independent example application

Reference :

1. “Guide to Designing and Implementing wireless LANs”, Mark Ciampa, Thomson learning, Vikas Publishing House, 2001.

2. “Wireless Web Development”, Ray Rischpater, Springer Publishing,

3. “The Wireless Application Protocol”, Sandeep Singhal, Pearson .

4. “Third Generation Mobile Telecommunication systems”, by P.Stavronlakis, Springer Publishers