Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)

Syllabus Scheme of M. Tech. in Computer Science & Engineering

Scheme of Teaching & Examination
M. Tech in COMPUTER SCIENCE & ENGINEERING
III - Semester

S. No.	Code	Subject	Periods Per Week			Scheme of Marks		Total Credit
			L	T	P	ESE	IM	
1.	MTCSE 321X	Elective - II	4	-	-	70	30	4
2.	MTCSE 322X	Elective - III	4	-	-	70	30	4
3.	MTCSE 323	Computational Techniques Using MATLAB	-	-	3	30	20	2
4.	MTCSE 324	Project Work Phase-I	-	-	24	140	60	12
Total			**8**	**0**	**27**	**310**	**140**	**22**

Elective,III

S. No	Subject Code	Name Of Subject
1.	MTCSE 3210	Agent Based Intelligent System
2.	MTCSE 3211	ADHOC Networks
3.	MTCSE 3212	Grid Computing
4.	MTCSE 3213	Software Project Management
5.	MTCSE 3214	Component Based Technology

Elective,IV

S. No	Subject code	Name of Subject
1.	MTCSE 3220	Data Warehousing & Data Mining
2.	MTCSE 3221	Design and Analysis of Parallel Algorithms
3.	MTCSE 3222	Digital Image Processing
4.	MTCSE 3223	Embedded Systems
5.	MTCSE 3224	Advanced Web Technology

P,Practical, IM,Internal Marks (Include Class Test & Teacher's Assessments)

L,Lecture, T,Tutorial, ESE,End Semester Examination,

Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)
Syllabus Scheme of M. Tech. in Computer Science & Engineering

AGENT BASED INTELLIGENT SYSTEMS (MTCSE3210)

Course Objective:

1. To study the fundamentals of intelligent system.
2. To learn the machine inference using predicate logic.
3. To study the use of agents in planning.
4. To study the machine learning concepts and it applicability using artificial intelligence.

UNIT – I INTRODUCTION

Definitions, Foundations, History, Intelligent Agents, Problem Solving, Searching, Heuristics, Constraint Satisfaction Problems, Game playing.

UNIT – II KNOWLEDGE REPRESENTATION AND REASONING

Logical Agents, First order logic, First Order Inference, Unification, Chaining, Resolution Strategies, Knowledge Representation, Objects, Actions, Events.

UNIT – III PLANNING AGENTS

Planning Problem, State Space Search, Partial Order Planning, Graphs, Nondeterministic Domains, Conditional Planning, Continuous Planning, Multi Agent Planning.

UNIT – IV AGENTS AND UNCERTAINITY

Acting under uncertainty, Probability Notation, Bayes Rule and its use, Bayesian Networks Other Approaches, Time and Uncertainty, Temporal Models, Utility Theory, Decision Network, Complex Decisions.

UNIT – V HIGHER LEVEL AGENTS

Knowledge in Learning, Relevance Information, Statistical Learning Methods, Reinforcement Learning, Communication, Formal Grammar, Augmented Grammars, Future of AI.

Text Book:

1. Artificial Intelligence , A Modern Approach, Stuart Russell and Peter Norvig, 2nd Edition, Prentice Hall, 2002

Reference Books:

1. An Introduction to Multi Agent System, Michael Wooldridge, John Wiley, 2002.
2. Artificial Intelligence, Patrick Henry Winston, III Edition, AW, 1999.
3. Principles of Artificial Intelligence, Nils.J. Nilsson, Narosa Publishing House, 1992.

Course Outcome:

After completion of the course study, students will be able to

1. Explain and develop agent based intelligent system.
2. Apply machine inference using predicate logic.
3. Use agents in planning system.
4. Apply machine learning concept while developing artificial intelligent system.

AD-HOC NETWORKS (MTCSE3211)

Course Objective:

1. To understand the state of the art in network protocols, architectures and applications.
2. To provide comprehensive knowledge of various techniques in mobile networks/Adhoc networks and sensor based networks.
3. To facilitate the understanding of Infrastructure less networks and their importance in the future directions for ad-hoc communications.

UNIT – I AD-HOC MAC

Introduction, Issues in AD-HOC Wireless Networks, MAC Protocols, Issues, Classifications of MAC protocols, Multi-channel MAC & Power control MAC protocol.

UNIT – II AD-HOC NETWORK ROUTING & TCP

Issues, Classifications of routing protocols, Hierarchical and Power aware. Multicast routing, Classifications, Tree based, Mesh based. AD-HOC Transport Layer Issues. TCP Over Ad Hoc, Feedback based, TCP with explicit link, TCP, Bus, Ad Hoc TCP, and Split TCP.

UNIT – III WSN-MAC

Introduction, Sensor Network Architecture, Data dissemination, Gathering. MAC Protocols-self organizing, Hybrid TDMA/FDMA and CSMA based MAC.

UNIT – IV WSN ROUTING, LOCALIZATION & QOS

Issues in WSN routing, OLSR, AODV, Localization, Indoor and Sensor Network Localization, QoS in WSN.

UNIT – V MESH NETWORKS

Necessity for Mesh Networks, MAC enhancements, IEEE 802.11s Architecture Opportunistic routing, Self configuration and Auto configuration, Capacity Models, Fairness, Heterogeneous Mesh Networks, Vehicular Mesh Networks.

Text/Reference Books:

1. Ad-Hoc Wireless Networks, Architectures and Protocols,C.Siva Ram Murthy and B. Smanoj, Pearson Education, 2004.
2. Wireless Sensor Networks, Feng Zhao and Leonidas Guibas, Morgan Kaufman Publishers, 2004.
3. Ad Hoc Mobile Wireless Networks, C.K.Toh, Pearson Education, 2002.
4. Wireless Mesh Networking, Thomas Krag and Sebastin Buettrich, O'Reilly Publishers, 2007.

Course Outcome:

After completion of the course study, students will be able to

1. Explain protocol, architecture and applications of Ad-hoc Networks.
2. Implement mobile networks, sensor networks and ad-hoc networks.
3. Develop infrastructure based networks.

Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)
Syllabus Scheme of M. Tech. in Computer Science & Engineering

GRID COMPUTING (MTCSE3212)

Course Objectives:

1. To understand the need for and evolution of Grids in the context of processor, and data intensive applications.
2. To be familiar with the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery.

UNIT – I INTRODUCTION TO GRID COMPUTING

Introduction: The Grid-Past - Present and Future, Applications of grid computing organizations and their roles.

UNIT – II GRID COMPUTING ARCHITURE

Grid computing anatomy, Next generation of Grid computing initiatives–Merging the Grid services architecture with Web services architecture.

UNIT – III GRID COMPUTING TECHNOLOGIES

OGSA, Sample use cases that drives the OGSA platform components, OGSI and WSRF– OGSA Basic Services, Security standards for grid computing.

UNIT – IV GRID COMPUTING TOOL KIT

Globus Toolkit –Versions, Architecture, GT Programming model –A sample grid service implementation.

UNIT – V HIGH LEVEL GRID SERVICES

High level grid services, OGSI.NET middleware Solution Mobile OGSI.NET for Grid computing on Mobile devices.

Text Book:

1. Grid Computing, Joshy Joseph & Craig Fellenstein, Pearson/PHI PTR,2003.

Reference Books:

1. Grid Computing: Making the Global Infrastructure a reality, Fran Berman, Geoffrey Fox, Anthony J.G. Hey, John Wiley and sons, 2003.
2. Grid Computing: A Practical Guide to Technology and Applications, Ahmar Abbas, Charles River media, 2003.

Course Outcome:

After completion of the course study, students will be able to

1. Justify the applicability, or non-applicability of Grid technologies for a specific application.
2. Evaluate enabling technologies such as high-speed links and storage area networks for building computer grids.
3. Design a grid computing application in one of the key application areas e.g. Computer Animation, EResearch.

Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)
Syllabus Scheme of M. Tech. in Computer Science & Engineering

SOFTWARE PROJECT MANAGEMENT (MTCSE3213)

Course Objective:

1. To understand the fundamental principles of Software Project management.
2. To have a good knowledge of responsibilities of project manager and how to handle these.
3. To be familiar with the different methods and techniques used for project management.
4. To understand the issues and challenges faced while doing the Software project Management.

UNIT – I BASIC CONCEPTS

Product, Process and Project, Definition, Product Life Cycle, Project Life Cycle Models.

UNIT – II FORMAT PROCESS MODELS AND THEIR USE

Definition and Format model for a process, The ISO 9001 and CMM Models and their relevance to Project Management, Other Emerging Models like People CMM.

UNIT – III UMBRELLA ACTIVITIES IN PROJECTS

Metrics, Configuration Management, Software Quality Assurance, Risk Analysis.

UNIT – IV IN STREAM ACTIVITIES IN PROJECTS

Project Initiation, Project Planning, Execution and Tracking, Project Wind up, Concept of Process/Project Database.

UNIT – V ENGINEERING AND PEOPLE ISSUES IN PROJECT MANAGEMENT

Phases (Requirements, Design, Development, Testing, Maintenance, Deployment), Engineering Activities and Management Issues in Each Phase, Special Considerations in Project Management for India and Geographical Distribution Issues.

Text/Reference Books:

1. Managing Global Projects, Ramesh, Gopalaswamy, Tata McGraw Hill, 2001.
2. Managing the Software Process, Humphrey, Watts, Addison Wesley, 1986.
3. Software Engineering, Pressman, Roger, A Practitioner's approach. McGraw Hill, 1997.
4. Software Project Management, Bob Hughes and Mike Cottrell.
5. Revolutionizing product development, Wheelwright and Clark, The Free Press, 1993.

Course Outcome:

After completion of the course study, students will be able to

1. Explain principles of Software Project Management.
2. Handle any project efficiently as Project Manager.
3. Apply various project management techniques.
4. Deal with issues related to project management.

Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)
Syllabus Scheme of M. Tech. in Computer Science & Engineering

COMPONENT BASED TECHNOLOGY (MTCSE3214)

Course Objective:

1. To enable the students to develop the necessary skills for developing robust & high performance applications.
2. To learn JAVA Component Technology.
3. To study technologies associated with distributed environment.
4. To learn relevant application development.

UNIT – I INTRODUCTION

Software Components, objects, fundamental properties of Component technology, modules, Interfaces, callbacks, directory services, component architecture, components and middleware.

UNIT – II JAVA COMPONENT TECHNOLOGIES

Threads, Java Beans, Events and connections, properties, introspection, JAR files, reflection, object serialization, Enterprise Java Beans, Distributed Object models, RMI and RMI, IIOP.

UNIT – III CORBA TECHNOLOGIES

Java and CORBA, Interface Definition language, Object Request Broker, system object model, portable object adapter, CORBA services, CORBA component model, containers, application server, model driven architecture.

UNIT – IV COM AND .NET TECHNOLOGIES

COM, Distributed COM, object reuse, interfaces and versioning, dispatch interfaces, connectable objects, OLE containers and servers, Active X controls, .NET components, assemblies, appdomains, contexts, reflection, remoting.

UNIT – V COMPONENT FRAMEWORKS AND DEVELOPMENT

Connectors, contexts, EJB containers, CLR contexts and channels, Black Box component framework, directory objects, cross, development environment, component, oriented programming, Component design and implementation tools, testing tools , assembly tools.

Text Book:

1. Component Software: Beyond Object Oriented Programming, Pearson Education publishers, 2003.

Reference Book:

1. Enterprise Java Beans, Ed Roman, Third Edition, Wiley, 2004.

Course Outcome:

After completion of the course study, students will be able to

1. Develop robust and high performance applications required for component technology/ distributed environment using JAVA and other relevant technologies.

DATA WAREHOUSING AND DATA MINING (MTCSE3220)

Course Objectives:

1. To understand the overall architecture of a data warehouse.
2. To discuss different data mining models and techniques.
3. To evaluate different models used for OLAP and data pre-processing.
4. To design and implement systems for data mining and evaluate the performance of different data mining algorithms.
5. To propose data mining solutions for different applications.
6. To differentiate online transaction processing and online analytical processing.
7. To learn the concepts of web mining.

UNIT – I DATA WAREHOUSING

Introduction, ETL, Data warehouses– design guidelines for data warehouse implementation, Multidimensional Models; OLAP- introduction, Characteristics, Architecture, Multidimensional view and data cube, Data cube operations, data cube computation. Review of the Basic Data Analytic Methods using R: Introduction to R –look at the data, Analyzing and Exploring the Data, Statistics for Model Building and Evaluation.

UNIT – II DATA MINING

Introduction, association rules mining, Naive algorithm, Apriori algorithm, direct hashing and pruning (DHP), Dynamic Item set counting (DIC), Mining frequent pattern without candidate generation(FP, growth), performance evaluation of algorithms.

UNIT – III CLASSIFICATION AND PREDICTION

Issues Regarding Classification and Prediction, Classification by Decision Tree Introduction, Bayesian Classification, Rule Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor , Ensemble Methods, Model Section.

UNIT – IV CLUSTER ANALYSIS

Types of Data in Cluster Analysis, Categorization of Clustering Methods, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint Based Cluster Analysis, Outlier Analysis.

UNIT – V WEB MINING

Search Engines: Characteristics of Search engines, Search Engine Functionality, Search Engine Architecture, Ranking of web pages, the search engine history, Enterprise Search, Enterprise Search Engine Software. Web Data Mining: Web Terminology and Characteristics, Locality and Hierarchy in the Web, Web Content Mining, Web Usage Mining, Web Structure Mining, Web Mining Software.

Text/Reference Books:

1. Data Mining Concepts and Techniques, Jiawei Han and Micheline Kamber, Second Edition,
2. Business Intelligence: Data mining and Optimization for Decision Making, Carlo Vercellis, WILEY.
3. Data Mining Concepts and Techniques, Han J., Kamber M. and Pei J. B., Morgan Kaufmann Publishers (2011) 3rd ed.
4. Data Mining, Pudi V., Krishana P.R., Oxford University press, (2009) 1st ed.
5. Data Mining Methods and Models, Daniel T.Larose, Wile-Interscience, 2006.

Course Outcome:

After completion of the course study, students will be able to

1. Design a data warehouse for an organization.
2. Write queries using DMQL.
3. Extract knowledge using data mining techniques.
4. Adapt new data mining tools.
5. Explore recent trends and advancement in data mining such as web mining, spatial-temporal mining.
6. Develop Web Mining applications.

Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)
Syllabus Scheme of M. Tech. in Computer Science & Engineering

DESIGN AND ANALYSIS OF PARALLEL ALGORITHMS (MTCSE3221)

Course objective:

1. To learn how to better design and analyze parallel algorithms.
2. To learn designing of scalable algorithms that perform well on the machines of tomorrow as well as the machines we have today.

UNIT – I INTRODUCTION TO PARALLELISM

Introduction to Parallel computers - SIMD - EREW, CREW SM-SIMD algorithms, shared memory SIMD, Tree and mesh interconnection computers.

UNIT – II SORTING IN PARALLEL ENVIRONMENT

Sorting - Sorting on a Linear Array**,** Sorting on a Mesh, Sorting on EREW SIMD computer, MIMD Enumeration Sort, MIMD Quick sort. Sorting on other Networks.

UNIT – III MATRIX OPERATIONS

Matrix operations - Mesh Transpose, Shuffle Transpose, EREW transpose – Mesh multiplication, Cube multiplication, Matrix by vector Multiplication, Tree Multiplication.

UNIT – IV MATHEMATICAL SOLUTIONS

Numerical problems- Linear Equations, SIMD algorithm, Roots of Nonlinear Equations, MIMD algorithm, partial Differential Equations, computing Eigen values.

UNIT – V GRAPH THEORY

Graph Theoretical Problems - computing the connectivity matrix. Finding connected components, Traversing. The minimal Alpha-Beta Tree, Storage requirements.

Text Books:

1. The Design and Analysis of Parallel Algorithms, S.G. Akl, Prentice Hall of India. 1989.
2. Parallel Sorting Algorithms, S. G. Akl, Academic Press, 1985.

Reference Book:

1. Analysis and Design of Parallel Algorithms - Arithmetic and Matrix Problems, S. Lakshmivarahan and S.Kdhall, McGraw Hill, 1990.

Course Outcome:

After completion of the course study, students will be able to

1. Design and analyze parallel algorithm.
2. Designing and implement scalable algorithms that perform well on the machines of tomorrow as well as the machines we have today.

Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)
Syllabus Scheme of M. Tech. in Computer Science & Engineering

DIGITAL IMAGE PROCESSING (MTCSE3222)

Course Objectives:

1. To learn the basic theory and algorithms that is widely used in digital image processing.
2. To give exposure to the students about current technologies and issues that is specific to image processing systems.
3. To develop idea of using computers to process images.
4. To develop critical thinking about shortcomings of the state of the art in image processing.

UNIT – I INTRODUCTION

Goal of Image processing and computer vision, Human visual perception – phenomena, Digital Image basics- Tessellation, Pixel and spatial resolutions, Image formation, Relations between pixels – neighborhoods, connectivity, distances, Basic problems in IP – enhancement, compression, restoration, image analysis.

UNIT – II SPATIAL DOMAIN PROCESSING

Point and neighborhood operations Image enhancement using above operations – contrast stretching, histogram proc., filtering, Geometric transformations, zooming. Image Arithmetic: Addition, subtraction, multiplication and division of images, Implementation issues. Color IP: Color definitions and models, False and Full colour IP.

UNIT – III IMAGE TRANSFORMS AND RESTORATION

Basis images and expansion of images using them Unitary transforms, DFT – properties and freq domain filtering (LPF, HPF etc), Directional filtering, DCT, Walsh Hadamard transform. Image Restoration: Restoration vs enhancement, Type of degradations, Geometric correction, Linear degradation models – Inverse filtering, Deconvolution.

UNIT – IV IMAGE COMPRESSION

Principles behind compression – types of redundancies, Entropy, compression ratios, SNR of compression, Lossy vs Lossless methods, Spatial approaches – Coding based, Transform based – DCT, JPEG.

UNIT – V MORPHOLOGICAL PROCESSING AND IMAGE ANALYSIS

Morphological processing – erosion, dilation, opening, closing, Skeletonisation, boundary detection
IMAGE ANALYSIS: Edge Detection, Segmentation, Thresholding, Region-Based, Edge Based Approaches.

Text Books:

1. Digital Image Processing, Gozalez and Woods; Addison- Wesley.
2. Fundamentals of Digital Image Processing, A. K. Jain; Prentice Hall.

Reference Books:

1. Digital Image processing using Matlab, R. Gonzalez; Addison- Wesley.
2. Image Processing: The fundamentals, M Petrou; Wiley and Sons.

Course Outcome:

After completion of the course study, students will be able to

1. Describe, analyze and reason about how digital images are represented, manipulated, encoded and processed, with emphasis on algorithm design, implementation and performance evaluation.
2. Apply principles and techniques of digital image processing in applications related to digital imaging system design and analysis.
3. Analyze and implement image processing algorithms.

Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)
Syllabus Scheme of M. Tech. in Computer Science & Engineering

EMBEDDED SYSTEM (MTCSE3223)

Course Objective:

1. To introduce modern embedded systems.
2. To understand and program such systems using a concrete platform built around a modern embedded processor.

UNIT – I INTRODUCTION

Introduction to Embedded systems, hardware/software code sign, Embedded micro controller cores, embedded memories, Examples of embedded systems, sensors and interfacing techniques, Real-time concepts.

UNIT – II REAL TIME OPERATING SYSTEM

Real-time operating systems, Required RTOS services/capabilities (in contrast with traditional OS), Resource Management/scheduling paradigms: static priorities, static schedules, dynamic scheduling, best effort current best practice in scheduling (e.g. Rate Monotonic vs. static schedules).

UNIT – III ISSUES REALTED TO EMBEDDED SYSTEM

Real world issues: blocking, unpredictability, interrupts, caching, Examples of OSs for embedded systems - RT Linux, VRTX.

UNIT – IV PROGRAMMING LANGUAGES

Programming languages for embedded systems e.g., Handel-C and Esterel, system support for embedded systems, selected embedded system-based applications: process control, robotics, etc.

UNIT – V SOFTWARE DEVELOPMENT METHODOLOGY

Software Development Methodology: Model based development, Statecharts, etc. Case studies, controlling an Injection molding process, Flight simulator, digital call center handler, codec.

Text/ Reference Books:

1. Specification and Design of Embedded Systems, D. Gajski, F. Vahid, S. Narayan, and J. Gong, Pearson Education.
2. Hardware Software Co-design: Principles and Practice, Syaunstrup and W. Wolf, Kluwer Academic Publishers.

Course Outcome:

After completion of the course study, students will be able to

1. Explain the concept of modern embedded systems.
2. To develop and program such systems using a concrete platform built around a modern embedded processor.

Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)
Syllabus Scheme of M. Tech. in Computer Science & Engineering

ADVANCED WEB TECHNOLOGY (MTCSE 3224)

Course Objective:

1. To familiar with client server architecture
2. To learn web application development using various technologies.
3. To have skills and project based experience into web application development.

UNIT – I INTRODUCTION

Web Essentials, Clients, Servers, Communication, Markup Languages, XHTML, Simple XHTML pages style sheets – CSS.

UNIT – II CLIENT SIDE PROGRAMMING

Client side programming, Java script language, java script objects, host objects: Browsers and the DOM.

UNIT – III SERVER SIDE PROGRAMMING

Server side programming, Java servlets, basics – simple program, separating programming and presentation, ASP/JSP - JSP basics ASP/JSP objects, simple ASP/JSP pages.

UNIT – IV WEB DATABASE

Representing Web Data, Database Connectivity, JDBC, Dynamic Web Pages, XML, DTD, XML Schema, DOM, SAX, XQuery.

UNIT – V WEB APPLICATIONS

Building Web Applications, Cookies, Sessions, Open Source Environment, PHP, MYSQL, Case Studies.

Text Books:

1. Web Technology – A computer Science perspective, Jeffrey C Jackson, Persoson Education, 2007.
2. Web Programming – Building Internet Applications, Chris Bates, Wiley India, 2006.

Course Outcome:

After completion of the course study, students will be

1. To explain and develop client server architecture of Web.
2. To develop web applications using various technologies.
3. Skilled to deal with the run time problems of web.

Department of Computer Science & Engineering
MATS University
Aarang, Raipur (C.G.)
Syllabus Scheme of M. Tech. in Computer Science & Engineering

COMPUTATIONAL TECHNIQUES USING MATLAB (MTCSE 323)

1. WAP to use MATLAB tool box for ANN.
2. WAP to use MATLAB tool box for Fuzzy Logic.
3. WAP to use MATLAB tool box for Optimization.
4. WAP to use MATLAB tool for implementing Neural Network.
5. WAP to use MATLAB tool for generating different types of activation functions in ANN.
6. WAP in MATLAB for training and testing of ANN.
7. WAP in MATLAB for load forecasting using ANN.
8. WAP in MATLAB for generating different types of Fuzzy membership functions.
9. WAP in MATLAB for feeder load balancing problem by fuzzy logic.
10. WAP in MATLAB for solving standard benchmark functions using Genetic algorithm.
11. WAP in MATLAB for solving economic load dispatch problem using Genetic Algorithm.