MAHATMA GANDHI UNIVERSITY

SCHEME AND SYLLABI

FOR

M. Tech. DEGREE PROGRAMME

IN

COMPUTER SCIENCE AND ENGINEERING

WITH SPECIALIZATION IN

INFORMATION SYSTEMS

SCHEME AND SYLLABI FOR M. Tech. DEGREE PROGRAMME IN COMPUTER SCIENCE AND ENGINEERING WITH SPECIALIZATION IN INFORMATION SYSTEMS SEMESTER - II

Sl. No.	Course No.	Subject	Hrs / Week			Evaluation Scheme (Marks)					Credits (C)
			L	T	P	Sessional			ESE	Total	
						TA	CT	Sub Total			
1	MCSIS 201	Advanced Computer Networks	3	1	0	25	25	50	100	150	4
2	MCSIS 202	Database System Concepts	3	1	0	25	25	50	100	150	4
3	MCSIS 203	Software Architecture	3	1	0	25	25	50	100	150	4
4	MCSIS 204	Algorithm Analysis and Design	3	1	0	25	25	50	100	150	4
5	MCSIS 205	Elective-III	3	0	0	25	25	50	100	150	3
6	MCSIS 206	Elective-IV	3	0	0	25	25	50	100	150	3
7	MCSIS 207*	Network Simulation Lab	0	0	3	25	25	50	100	150	2
8	MCSIS 208	Seminar-II	0	0	2	50	0	50	0	50	1
Total			**18**	**4**	**5**	**225**	**175**	**400**	**700**	**1100**	**25**

L – Lecture, **T** – Tutorial, **P** – Practical

Elective – III (MCSIS 205)		Elective – IV (MCSIS 206)	
MCSIS 205-1	Software Testing	MCSIS 206-1	Principles of Network Security
MCSIS 205-2	Wireless Sensor Networks	MCSIS 206-2	Computer Vision
MCSIS 205-3	Bioinformatics	MCSIS 206-3	Ontology and Semantic Web
MCSIS 205-4*	Parallel Algorithms	MCSIS 206-4	Multiagent systems

TA – Teacher's Assessment (Assignments, attendance, group discussion, Quiz, tutorials, seminars, etc.)
***** – Subjects common for Computer Science specializations.
CT – Class Test (Minimum of two tests to be conducted by the Institute)
ESE – End Semester Examination to be conducted by the University
Electives: New Electives may be added by the department according to the needs of emerging fields of technology. The name of the elective and its syllabus should be submitted to the University before the course is offered.

MCSIS 201 **ADVANCED COMPUTER NETWORKS**

L	T	P	C
3	1	0	4

Module 1: Physical Layer and Data link layer

Physical Layer: Transmission Media- Wired Transmission, Wireless Transmission, Wireless Propagation, Signal Encoding Techniques.
Data link layer: TCP/IP Protocol Architecture, Framing, Reliable Transmission, Ethernet (802.3) and Token Ring (802.5).

Module 2: Network Layer

Connecting Devices. ARP, RARP. IP Address – Sub netting / Super netting, Packet Forwarding with Classfull / Classless Addressing, Datagram Fragmentation, Components in IP software, Private IP and NAT. ICMP. Routing Protocols -Distance Vector Routing-RIP, Link-State Routing-OSPF

Module 3: Transport Layer and ATM Networks

UDP- Port Addressing, UDP datagram, UDP operation. TCP- TCP services and features, TCP segment, TCP connection, TCP state transitions, TCP module's algorithm, Flow and Error control, Congestion control. SCTP- SCTP services and features, Packet format, SCTP connection, State Transitions, Flow and Error control. ATM NETWORKS - ATM Layer Structure, ATM Cell, Routing:-VPI, VCI, AAL

Module 4: Application Layer

DNS- Distribution of Name Space, Name Resolution, DNS messages, HTTP- Architecture, HTTP Transaction, DHCP - Address allocation, Packet format. SNMP- SMI, MIB, SNMP PDUs, Real Time Data Transfer- RTP, RTCP, Voice over IP-Session Initiation Protocol.

References:

1. William Stallings, "Data and Computer Communications", Pearson Education.
2. Behrouz A Forouzan, "TCP/IP Protocol Suite", Tata McGraw-Hill.
3. Peterson and Davie, "Computer Networks -A systems approach", Elsevier.
4. Kurose and Ross, "Computer Networks A systems approach", Pearson Education.
5. Behurouz A Forouzan, "Data Communications & Networking", 4th edition, McGraw-Hill.

MCSIS 202 **DATABASE SYSTEM CONCEPTS**

L	T	P	C
3	1	0	4

Module1: Parallel and Distributed Databases

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Three Tier Client Server Architecture- Case Studies**.**

Module 2: **Object and Object relational databases**

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL / Oracle – Case Studies.

Module 3: Enhanced Data models

Active Database Concepts and Triggers – Temporal Databases – Spatial Databases – Multimedia Databases – Deductive Databases – XML Databases: XML Data Model – DTD - XML Schema - XML Querying - Geographic Information Systems - Genome Data Management**.**

Module 4: Emerging Technologies

Big data, Parallel processing and query optimization, Hadoop, MAP REDUCE XML, Object relational data base, Spatial database, Temporal databases, Intelligent databases, Multimedia databases

References:

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2007.
3. Vijay Kumar,” Mobile Database Systems”, A John Wiley & Sons, Inc., Publication.
4. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, Fifth Edition, McGraw Hill, 2006.
5. C.J. Date, A.Kannan and S.Swamynathan,”An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
6. Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, McGraw Hill, Third Edition 2004.
7. IBM Zikopoulos, Paul, Chris Eaton, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data” McGraw Hill Professional

MCSIS 203 **SOFTWARE ARCHITECTURE**

L	T	P	C
3	1	0	4

Module 1: Introduction

Introduction to Software Architecture, Architecture Business Cycle:-, Where do Architectures Come from, Software Processes and the Architecture Business Cycle, Features of Good Architecture. What is software architecture:- Architectural patterns- Reference Models, and Reference Architectures, Importance of software Architecture, Architectural structures and views.

Module 2: Architectural Styles

Pipes and Filters-Data Abstraction and Object Oriented Organization-Event based, Implicit Invocation-Layered Systems-Repositories-Interpreters-Process Control-Process control Paradigms-Software Paradigm for Process Control-Distributed processes-Main program / subroutine organizations – Domain – specific software architecture – heterogeneous architectures. Case Study:- Keyword in Context, Mobile Robotics

Module 3: Shared Information Systems

Shared Information Systems Database Integration:- Batch Sequential, Simple Repository, Virtual Repository, Hierarchical layers, Evolution of shared information systems in business data processing, Integration in Software Development Environments, Integration in the design of Buildings, Architectural Structures for Shared Information Systems Database Integration

Module 4: Architectural Design Guidance

Guidance for User-Interface Architectures -Design Space and rules-Design Space for User Inter face Architectures-Design. Rules for User Interface Architecture applying the Design Space – Example – A Validation Experiment – How the Design Space Was Prepared.

References:

1. Mary Shaw, David Garlan, “Software Architecture”, Prentice Hall India, 2000.
2. Len Bass, Paul Clements, Rick Kazman, “Software architectures in practice”, Addison-Wesley, 2003.

MCSIS 204 **ALGORITHM ANALYSIS AND DESIGN**

L	T	P	C
3	1	0	4

Module 1

Algorithms – Complexity and notations – Recurrences - Algorithmic Techniques: Backtracking – Branch and bound - Divide-and-Conquer – Merge Sort– Dynamic Programming – All pair shortest path problem – Greedy strategy – Knapsack problem - Space Bounded Computation (basic concept only)

Module 2

Sorting Networks - Comparison networks - The zero-one principle - A bitonic sorting network - A merging network - A sorting network
String Matching - The naive string-matching algorithm - The Rabin-Karp algorithm - String matching with finite automata - The Knuth-Morris-Pratt algorithm

Module 3

Randomization - Basic Probability - Markov's Inequality - Chebyshev Inequality - Universal Hashing - Expectations - Tail Bounds – Chernoff bound, Markov Chains and Random Walks – Applications of randomized algorithms

Module 4

Approximation Algorithms for NP -Hard Problems - Approximation Algorithms for the Traveling Salesman Problem - Approximation Algorithms for the Knapsack Problem
Algorithms for Solving Nonlinear Equations - Bisection Method - Method of False Position - Newton's Method

References

1. Introduction to Algorithms (3rd Ed):Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, MIT Press
2. Horowitz, Sahni, Rajasekharan, "Fundamentals of computer algorithms", Galgotia Publications
3. Lectures in Computational Complexity , Jin-Yi Cai , Department of Computer Sciences , University of Wisconsin
4. Algorithm Design: Jon Kleinberg and Eva Tardos, Addison Wesley
5. Anany V. Levitin. Introduction to the Design & Analysis of Algorithms (2nd Ed): Addison Wesley
6. Randomized Algoritms: Rajeev Motwani and Prabhakar Raghavan, Cambridge University Press

MCSIS 205-1 **SOFTWARE TESTING**

L	T	P	C
3	0	0	3

Module 1.

Fundamentals of Testing and Role of Testing in SDLC Human and errors, Testing and Debugging, Software Quality, Requirement Behavior and Correctness, Fundamentals of Test Process, Psychology of Testing, General Principles of Testing, Test Metrics. Review of software development models (Waterfall Models, Spiral Model, W Model, V Model) Agile Methodology and Its Impact on testing, Test Levels (Unit, Component, Module, Integration, System, Acceptance, Generic)

Module 2. Approaches to Testing

Static Testing Structured Group Examinations Static Analysis Control flow & Data flow, Determining Metrics Dynamic Testing Black Box Testing Equivalence Class Partitioning, Boundary Value Analysis, State Transition Test, Cause Effect Graphing and Decision Table Technique and Used Case Testing and Advanced black box techniques White Box Testing Statement Coverage, Branch Coverage, Test of Conditions, Path Coverage, Advanced White Box Techniques, Instrumentation and Tool Support Gray Box Testing, Intuitive and Experience Based Testing

Module 3. Test Management

Test Organization Test teams, tasks and Qualifications Test Planning Quality Assurance Plan, Test Plan, Prioritization Plan, Test Exit Criteria Cost and economy Aspects Test Strategies Preventive versus Reactive Approach, Analytical versus heuristic Approach Test Activity Management, Incident Management, Configuration Management Test Progress Monitoring and Control Specialized Testing: Performance, Load, Stress & Security Testing

Module 4. Testing tools

Automation of Test Execution, Requirement tracker, High Level Review Types of test Tools, Tools for test management and Control, Test Specification, Static Testing, Dynamic Testing, Non functional testing Selection and Introduction of Test Tools Tool Selection and Introduction, Cost Effectiveness of Tool Introduction

Text Books

1. Software Testing Foundations, Andreas Spillner, Tilo Linz, Hans Schaefer, Shoff Publishers and Distributors
2. Software Testing: Principles and Practices by Srinivasan D and Gopalswamy R, PearsonEd, 2006
3. Foundations of Software Testing by Aditya P. Mathur – Pearson Education custom edition 2000
4. Testing Object Oriented Systems: models, patterns and tools, Robert V Binder, Addison Wesley, 1996
5. Software Engineering – A practitioner's approach by Roger S. Pressman, 5th Edition, McGraw Hill
6. The art of software testing by GJ Myers, Wiley.

MCSIS 205-2 **WIRELESS SENSOR NETWORKS**

L	T	P	C
3	0	0	3

Module 1: Introduction

Fundamentals of wireless communication technology, the electromagnetic spectrum, radio propagation, characteristics of wireless channels, modulation techniques, multiple access techniques, wireless LANs, PANs, WANs, and MANs, Wireless Internet.

Module 2: Introduction to adhoc/sensor networks

Key definitions of adhoc/ sensor networks, unique constraints and challenges, advantages of ad-hoc/ sensor network, driving applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture, data dissemination and gathering.

Module 3: MAC Protocols and Routing Protocols

Issues in designing MAC protocols for adhoc wireless networks, design-goals, classification of MAC protocols, MAC protocols for sensor network, location discovery, quality, other issues, S-MAC, IEEE 802.15.4. Routing Protocols-Issues in designing a routing protocol, classification of routing protocols, table-driven, on-demand, hybrid, flooding, hierarchical, and power aware routing protocols.

Module 4: QoS and Energy Management

Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes.

Text Books

1. Feng Zhao and Leonides Guibas, "Wireless sensor networks ", Elsevier publication - 2004

Reference Books

1. Jochen Schiller, " Mobile Communications". Pearson Education, 2nd Edition, 2003.
2. William Stallings, "Wireless Communications and Networks", Pearson Education-2004

MCSIS 205-3 **BIOINFORMATICS**

L	T	P	C
3	0	0	3

Module 1: Fundamentals of Biological Systems

Introduction to cells: Structure of prokaryotic and eukaryotic cells. Cell organelles and their functions. Molecules of life: Introduction to carbohydrates, proteins, lipids and nucleic acids - Different structural forms and functional organizations. DNA replication, transcription and translation. Gene regulation.

Module 2: Sequence Analysis

Introduction to Sequence alignment, Substitution matrices, Scoring matrices –PAM and BLOSUM. Local and Global alignment concepts, dot plot, dynamic programming methodology, Multiple sequence alignment –Progressive alignment. Database searches for homologous sequences – FASTA and BLAST versions.

Module 3: Genomics

Functional Genomics: Gene expression analysis by cDNA micro arrays, SAGE, Strategies for generating ESTs and full length inserts; EST clustering and assembly; EST databases- DBEST, UNIGENE. Gene/Protein function prediction using Machine learning tools: supervised / unsupervised learning, Neural network, SVM.

Module 4: Proteomics

Protein and RNA structure prediction, secondary and tertiary structure, polypeptic composition, computational methods for identification of polypeptides from mass spectrometry, algorithms for modeling protein folding, protein classification.
Protein-Protein Interaction: Experimental identification of protein-protein interactions, PPI databases: STRINGS, DIP, PPI server. Protein-protein quaternary structure modeling- Proteinprotein docking algorithms, Homology modeling, Monte Carlo docking simulation.

References:

1. David W. Mount “Bioinformatics Sequence and Genome Analysis”, Cold Spring Harbor laboratory Press, 2001.
2. C. Rastogi, Namita Mendiratta, Parag Rastogi. ”Bioinformatics-Concepts, Skills, Applications”.
3. Andreqas D. Baxevanis, B. F. Francis Ouellette., "Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins “, John Wiley and Sons, New York 1998.
4. Andrew, R. Leach, “Molecular modelling: Principles and applications”, Prentice Hall Publications.
5. Richard Durbin, S. Eddy, A. Krogh, G. Mitchison,”Biological Sequence Analysis: Probabilistic models of protein and Nucleic acids” Cambridge University Press 2007.
6. Thomas E. Creighton, “Proteins: structures and molecular properties”

MCSIS 205-4* **PARALLEL ALGORITHMS**

L	T	P	C
3	0	0	3

Module 1:

PRAM Model - PRAM Algorithms – Parallel Reduction – Prefix Sums – List Ranking – Preorder Tree Traversal – Merging Two Sorted Lists – Graph Coloring – Reducing Number of Processors

Module 2:

Classifying MIMD Algorithms - Hypercube SIMD Model – Shuffle Exchange SIMD Model – 2D Mesh SIMD Model – UMA Multiprocessor Model – Broadcase – Prefix Sums.
Matrix Multiplication on 2-D Mesh, Hypercube and Shuffle Exchange SIMD Models – Algorithms for Multiprocessors – Algorithms for Multicomputers

Module 3:

Enumeration Sort - Lower Bound on Parallel Sorting – Odd-Even Transposition Sort – Bitonic Merge –Complexity of Parallel Search – Searching on Multiprocessors – Ellis's Algorithm – Manber and Ladner's Algorithm
OpenMP- Introduction, The OpenMP for Pragma- Dijkstra Shortest-Path Algorithm with Parallel for Loops, Task Directive- Quicksort, OpenMP Synchronization Issues

Module 4:

P-Depth Search - Breadth Death Search – Breadth First Search – Connected Components – All pair Shortest Path – Single Source Shortest Path – Minimum Cost Spanning Tree – Sollin's Algorithm – Kruskal's Algorithm

References:

1. Michael J. Quinn, Parallel Computing : Theory & Practice, Tata McGraw Hill Edition, Second Edition, 2008.
2. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, Introduction to Parallel Computing, 2nd Edition, Addison Wesley, 2003
3. Norm Matlo, Programming on Parallel Machines, University of California

MCSIS 206-1 **PRINCIPLES OF NETWORK SECURITY**

L	T	P	C
3	0	0	3

Module 1

Web application security- Key Problem factors – Core defence mechanisms- Handling user access- handling user input- Handling attackers – web spidering – Discovering hidden content
Transmitting data via the client – Hidden form fields – HTTP cookies – URL parameters – Handling client-side data securely – Attacking authentication – design flaws in authentication mechanisms –securing authentication
Attacking access controls – Common vulnerabilities – Securing access controls

Module 2

Symmetric Key cryptography: Block cipher design principles and criteria, DES, IDEA, AES, RCS, Blowfish, Differential and linear cryptanalysis. Asymmetric key cryptography: Principles of public key crypto systems, RSA algorithm, key management, Diffie-Hellman key exchange
SQL Injection - How it happens - Dynamic string building - Insecure Database Configuration - finding SQL injection – Exploiting SQL injection – Common techniques – identifying the database – UNION statements – Preventing SQL injection- Database Hacking – Database discovery – Database vulnerabilities

Module 3

Platform level defenses - Using run time protection - web application Firewalls - Using ModSecurity - Intercepting filters- Web server filters - application filters – securing the database – Locking down the application data – Locking down the Database server

Module 4

System Security- Intrusion Detection, Password Management, Viruses and related threats, Virus counter measures, Firewalls-Design Principles, Trusted Systems, Web Security:- Web Security consideration, Secure Socket Layer, Transport Layer Security, Secure Electronic Transaction.

References:

1. William Stallings, “Cryptography and network security- principles and practice”, 3 rd Edition, Pearson Prentice Hall.
2. Dafydd Stuttard, Marcus Pinto, The Web Application Hacker’s Handbook, 2nd Edition, Wiley Publishing, Inc.
3. Justin Clarke, SQL Injection Attacks and Defense, 2009, Syngress Publication Inc.
4. Magnus Mischel , ModSecurity 2.5, Packt Publishing
5. Atul Kahate, “Cryptography and network security“, TMGH
6. Stuart McClure Joel, ScambRay, George Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, Seventh Edition, 2012, The McGraw-Hill Companies

MCSIS 206-2 **COMPUTER VISION**

L	T	P	C
3	0	0	3

Module 1: Digital Image Fundamentals

Digital image Representation – Functional Units of an Image processing system. Visual perception - -Image Model - Image sampling and Quantization - grayscale resolution - pixel relationship - image geometry Image Transforms – Unitary Transform, Discrete Fourier Transform, Cosine Transform, Sine Transform, Hadamard Transform, Slant and KL Transform.

Module 2: Image Analysis and Computer Vision

Spatial feature Extraction – Transform feature – Edge detection-Boundary Representation-Region Representation-Moment Representation- Structure-Shape Features-Texture-Scene Matching and Detection-Image Segmentation- Classification techniques-Morphology-Interpolation.

Module 3: Object Recognition

Recognition – Object classification and detection – Face recognition or Haar classifier – Instance recognition – Category recognition – Context and scene understanding – Human motion recognition

Module 4: Sensing 3D shape

How the 3rd dimension changes the problem. Stereo 3D description, 3D model, matching, TINA, Direct 3D sensing-structured light, range finders, range image segmentation Emerging IT applications: Recognition of characters, Fingerprints and faces-Image databases.

Text Books

1. Image Processing and Machine Vision-Milan Sonka, Vaclav Hlavae

Reference Books

1. Syntactic Pattern Recognition and Applications - King Sun Fun
2. Computer Vision - Fairhurst (PHI).
3. Computer Vision: Algorithms and Applications, by Richard Szeliski, Springer, 2010.
4. Learning OpenCV, by Gary Bradski & Adrian Kaehler, O'Reilly Media, 2008.
5. Multiple View Geometry in Computer Vision, 2nd Edition, by R. Hartley, and A. Zisserman, Cambridge University Press, 2004.
6. Computer Vision: A Modern Approach, by D.A. Forsyth and J. Ponce, Prentice Hall, 2002.
7. Pattern Classification (2nd Edition), by R.O. Duda, P.E. Hart, and D.G. Stork, Wiley-Interscience, 2000.

MCSIS 206-3 ONTOLOGY AND SEMANTIC WEB

L	T	P	C
3	0	0	3

Module 1: Foundations of Semantic Web

Today's web and keyword based search, Semantic Web, Examples, Semantic web technologies- Sources of semantic Data- using Semantic search- Linked Data-Vocabularies, Taxonomies and Ontologies - Overview of Ontology Elements Requirements of ontology languages, Examples of published Ontology- Semantic Web versus Artificial Intelligence, A Layered approach to Semantic Web

Module 2: Modeling Information

Resource Description Framework –RDF triple form- RDF Graph-simple examples-advantages-RDF Schema- Basic Ideas, Language- Exchanging Information With RDF, Statements As Points, RDF Serializations , RDF/XML, Blank Nodes In RDF, Reification, Limitations Of RDF Schema, RDFS entailment -SPARQL- Simple Query Example

Module 3: Knowledge Representation

Web Ontology Language OWL, Examples- Sublanguages-OWL DL- Description Logics- A Box T Box split
Predicate Logic and Rule Systems, Horn Logic-Monotonic Rule Systems, Non Monotonic Rule-Systems -Rule Languages- RuleML, SWRL, ORL

Module 4: Logic and Inference

Semantic Web Frameworks , Retrieving Information in a Knowledgebase , Realizing the Semantics of OWL , Understanding Forward Chaining Inference , Understanding Backward Chaining Inference , Choosing the Right Inference Method- Common Frameworks and Components- Jena, Sesame - RDF store implementations-Retrieval Components-Reasoning Engines

References:

1. Grigoris Antoniou and Frank van Harmelen. A Semantic Web Primer, MIT Press,2004.
2. John Hebeler, Matthew Fisher, Ryan Blace, Andrew Perez-Lopez, Semantic Web Programming, Wiley Publishing, Inc, 2009.
3. Thomas B. Passin,Explorer's Guide to the Semantic Web, Manning, Pearson, July 2004.
4. John Davies, Dieter Fensel, Towards the Semantic Web: Ontology-driven Knowledge management,John Wiley& Sons Ltd, 2003.
5. Davies, John, Rudi Studer, and Paul Warren, Semantic Web Technologies : Trends and Research in Ontology-Based Systems, John Wiley & Sons, 2006.
6. Bhavani Thuraisingham, XML Databases and the Semantic Web, CRC Press, 2002.
7. Dieter Fensel, James A. Hendler, Henry Lieberman and Wolfgang Wahlster, Spinning the Semantic Web- Bringing the World Wide Web to Its Full Potential, MIT Press, 2002
8. The Fundamental Importance of Keeping an ABox and TBox Split,Ontology Best Practices for Data-driven Applications: Part 2, http://www.mkbergman.com/489/ontology-best-practices-for-data-driven-applications-part-2/
9. Toby Segaran,Colin Evans,Jamie Taylor, Programming the semantic web, O'Reilly, July 2009

MCSIS 206-4 **MULTIAGENT SYSTEMS**

L	T	P	C
3	0	0	3

Module 1

Introduction: what is an agent: agents and objects; agents and expert systems; agents and distributed systems; Developing intelligent agents for distributed Systems, typical application areas for agent systems: - monitoring and diagnostics, distributed control, protection systems, and modeling and simulation.

Module 2

Intelligent Agents: abstract architectures for agents; Structure of agents, Classes of intelligent agents simple reflex agents, model-based reflex agents, goal-based agents, utility-based agents, learning agents, Hierarchies of agents, tasks for agents, the design of intelligent agents: reasoning agents, agents as reactive systems; hybrid agents layered agents

Module 3

Multiagent Systems: ontologies: OWL, KIF, RDF; interaction languages and protocols: speech acts, KQML/KIF, the FIPA framework; cooperation: cooperative distributed problem solving (CDPS), partial global planning; coherence and coordination; applications.
Planning – Components of planning systems – Planning with state space search – Partial order planning – Planning Graphs – Hierarchical planning – Multi agent planning.
Agent oriented programming language – KQML as an agent communication language – Java implementation of intelligent agents JADE – Languages supporting mobility – Telescript.

Module 4

Multiagent Decision-Making: multi-agent interactions: solution concepts; pure and mixed strategy Nash equlibria; cooperative versus non-cooperative; zero-sum and other interactions; how cooperation occurs | the Prisoner's dilemma and Axelrod's experiments; program equilibria; computational social choice: voting protocols; Arrow's theorem; Gibbard-Satterthwaite theorem; logical foundations of multi-agent systems: modal logics for epistemic reasoning, reasoning about mental state; cooperation logics; applications of such logics.

Text Books

1. M.Wooldridge, An Introduction to MultiAgent Systems Second Edition. John Wiley & Sons, 2009.
2. Yoav Shoham, Kevin Leyton-Brown, “Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations”
3. Artificial intelligence - A modern approach by Stuart Russell & Peter Norvig.

MCSIS 207* **NETWORK SIMULATION LAB**

L	T	P	C
0	0	3	2

1. A thorough study of packet capturing tool called WireShark.

2. Familiarizing Network Simulator – 2 (NS2) with suitable examples

3. Simulate a wired network consisting of TCP and UDP Traffic using NS2 and then calculate their respective throughput using AWK script.

4. Performance evaluation of different routing protocols in wired network environment using NS2

5. Performance evaluation of different queues and effect of queues and buffers in wired network environment using NS2

6. Compare the behavior of different variants of TCP (Tahoe, Reno, Vegas….) in wired network using NS2. Comparison can be done on the congestion window behavior by plotting graph.

7. Simulation of wireless Ad hoc networks using NS2

8. Simulate a wireless network consisting of TCP and UDP Traffic using NS2 and then calculate their respective throughput using AWK script.

9. Performance evaluation of different ad-hoc wireless routing protocols (DSDV, DSR, AODV …) using NS2
10. Create different Wired-cum-Wireless networks and MobileIP Simulations using NS2

MCSIS 208 **SEMINAR - II**

L	T	P	C
0	0	2	1

Each student shall present a seminar on any topic of interest related to the core / elective courses offered in the first semester of the M. Tech. Programme. He / she shall select the topic based on the References: from international journals of repute, preferably IEEE journals. They should get the paper approved by the Programme Co-ordinator / Faculty member in charge of the seminar and shall present it in the class. Every student shall participate in the seminar. The students should undertake a detailed study on the topic and submit a report at the end of the semester. Marks will be awarded based on the topic, presentation, participation in the seminar and the report submitted.