M.Tech (Full Time) – KNOWLEDGE ENGINEERING

Curriculum & Syllabus

(2008-2009)

Faculty of Engineering & Technology

SRM University

SRM Nagar, Kattankulathur – 603 203

S.R.M. UNIVERSITY
SCHOOL OF COMPUTER SCIENCE & ENGINEERING
M.Tech (Knowledge Engineering
Curriculum & Syllabus
(2008-2009)

I SEMESTER

Subject Code	Subject Name	L	T	P	C
Theory					
MA0533	Mathematical Foundations of Computer Science	3	0	0	3
CS0541	Artificial Intelligence & Intelligent Systems	3	0	3	4
CS0543	Knowledge Based System Design	3	2	0	4
CS0545	Data & Knowledge Mining	3	2	0	4
	Elective – I	3	0	0	3
Total		**15**	**4**	**3**	**18**

II SEMESTER

Subject Code	Subject Name	L	T	P	C
Theory					
CS0540	Semantic Web	3	2	0	4
CS0542	Knowledge Based Neural Computing	3	0	3	4
CS0544	Agent Based Learning	3	2	0	4
	Elective – II	3	0	0	3
	Elective – III*	3	0	0	3
Total		**15**	**4**	**3**	**18**

* Elective – III shall be an Inter Departmental (or) Inter School Elective

III SEMESTER

Subject Code	Subject Name	L	T	P	C
Theory		3	0	0	3
	Elective –IV	3	0	0	3
	Elective - V	3	0	0	3
	Elective - VI	3	0	0	3
CS0550	Seminar	0	2	0	1
Practical					
CS0645	Project Phase - I	0	0	12	6
Total		**9**	**2**	**12**	**16**

IV SEMESTER

Subject Code	Subject Name	L	T	P	C
CS0646	Project Phase - II	0	0	36	18
Total		**0**	**0**	**36**	**18**

TOTAL CREDITS TO BE EARNED : 70

Electives for First Semester

Subject Code	Subject Name	L	T	P	C
CS0685	Multimedia Systems	3	0	0	3
CS0561	Geographical Information Systems	3	0	0	3
CS0563	Professional Studies	3	0	0	3
CS0553	Genetic Algorithms & Machine Learning	3	0	0	3

Electives for Second Semester

Subject Code	Subject Name	L	T	P	C
CS0650	Pattern Recognition Techniques	3	0	0	3
CS0693	Grid Computing	3	0	0	3
CS0578	Human Interface System Design	3	0	0	3
CS0572	Decision Support Systems	3	0	0	3
CS0641	Reasoning under Uncertainty	3	0	0	3
CS0643	Fuzzy Expert systems & Fuzzy Reasoning	3	0	0	3

Electives for Third Semester

Subject Code	Subject Name	L	T	P	C
CS0655	Data Warehousing				
CS0683	Speech and Language Processing	3	0	0	3
CS0663	Deductive & Inductive Reasoning	3	0	0	3
CS0665	Bio Informatics	3	0	0	3
CS0681	Machine Vision	3	0	0	3
CS0673	Software Reuse	3	0	0	3
CS0546	Spatio -Temporal Reasoning	3	0	0	3
CS0562	Digital Image Processing	3	0	0	3
CS0689	Embedded Technology	3	0	0	3

ASSESSMENT PROCEDURE

Assessment	Examinations	Weightage in %		
		Course with Practical	Course without Practical	Course without Theory
Continuous	1.Announced Quiz	10	10	--
	2. Unannounced Quiz	10	10	--
	3. Test – I	10	20	--
	4.Test – 2	10	20	--
	6. Review – I	--	--	10
	7. Review – 2	--	--	20
	8. Review - 3	--	--	30
Final Theory	--	30	30	--
Final Practical	--	20	--	--
Final Review	--	--	--	30
Term Paper/ Thesis	--	10	10	10

MA0533	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	L	T	P	C
		3	0	0	3

Logic - Statements – Connectives – Truth tables – Normal forms – Predicate calculus – Inference Theory for Statement calculus and predicate calculus. Combinatorics - Mathematical Induction – Pigeonhole principle – Principle of inclusion and exclusion. Recursive Functions- Recurrence relation – Solution of recurrence relation using characteristic polynomial and using generating function – Recursive functions – Primitive recursive functions, Computable and non computable functions. Algebraic Structures - Groups – Definition and examples only – Cyclic groups – Permutation group (Sn and Dn) – Subgroups – Homomorphism and Isomorphism – Cosets – Lagrange's Theorem – Normal subgroups – Cayley's representation theorem. Lattices - Partial order relations, poset – Lattices, Hasse diagram – Boolean algebra.

TEXT BOOKS
1. Tremblay J.P. and Manohar R., "Discrete Mathematical Structures with applications to Computer Science", McGraw Hill International Edition, 1987Kenneth H. Rosen, Discrete Mathematics and Its Applications, 4th Edition, Tata McGraw Hill, 2002
2. Venkataraman M.K. etal., "Discrete Mathematics", National Publishing Co.,2000
3. Prof. V. Sundaresan, K.S. Ganapathy Subramanian and K. Ganesan, Discrete Mathematics, New Revised Edition, 2001.
4. Alan Doerr and Kenneth Levasseur, "Applied Discrete Structures for Computer Science", Galgotia Publications (P) Ltd.,1992

REFERENCE BOOKS
1. C.L. Liu, Elements of Discrete Mathematics, 2nd Edition, McGraw Hill Publications, 1985.
2. Gersting. J.L. Mathematical Structures for Computer Science, 3rd Edition, W.H. Freeman and Co., 1993.
3. Lidl and Pitz, Applied abstract Algebra, Springer – Verlag, New York, 1984.

		L	T	P	C
CS0541	ARTIFICIAL INTELLIGENCE AND INTELLIGENT SYSTEMS	3	0	3	4
	Prerequisite				
	Nil				

PURPOSE
The purpose of this course is to give students a comprehensive understanding of Artificial Intelligence and Intelligent Systems in the context of Knowledge Engineering.

INSTRUCTIONAL OBJECTIVES
• To provide a strong foundations of fundamental concepts in Artificial Intelligence
• To get familiar with the various applications of these techniques in Intelligent Systems.

Representation Of Knowledge And Reasoning Methods :Intelligent Agents – Knowledge representation – First-Order Logic – Inference In First-Order Logic – AI and Internal Representation
Visual Perception And Language Understanding: Vision – Recognizing Objects – Describing Images – Parsing Language; Learning And Communication - Learning From Observations – Knowledge In Learning – Statistical Learning Methods – Communication – Perception
Game Playing, Planning, Understanding, Common Sense - Advanced Topics: Game Playing, Planning, Understanding, Common Sense
Abduction, Uncertainty, Expert Systems And Robotics : What Is Abduction? – Acting Under Uncertainty – Defining Expert Systems - Robot Architectures
Practicals:
1. DFS And BFS implementation
2. Game playing : single,two palyers(Using Heuristic Function)
3. A* Algorithm
4. Syntax Checking of English sentences.
5. Develop an Expert system

TEXT BOOKS

1. Stuart Russell, Peter Norvig: "Artificial Intelligence: A Modern Approach",2nd Edition, Pearson Education, 2007
2. N.P.Padhy: "Artificial Intelligence and Intelligent Systems",4th impression , Oxford University Press, 2007
3. Elaine Rich, Kevin Knight: " Artificial Intelligence" 2nd Edition, Tata McGraw-Hill, 2006
4. Patrick Henry Winston: "Artificial Intelligence" 3rd Edition, Pearson Education, 2004
5. Eugene Charniak, Drew McDermott: "Introduction to Artificial Intelligence", Pearson Education 2004

REFERENCE BOOKS:

1. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education 2007
2. Patrick Henry Winston,Bartbold Klaus,Paul Horn: "LISP" 3rd Edition,Pearson Education
3. Ivan Bratko: "Prolog:Programming for Artificial Intelligence",Pearson Education

		L	T	P	C
CS0543	**KNOWLEDGE BASED SYSTEM DESIGN**	3	2	0	4
	Prerequisite				
	Nil				

PURPOSE
This course provides a comprehensive view of Knowledge Based System Design in the context of Knowledge Engineering

INSTRUCTIONAL OBJECTIVES
By the end of the course, students will satisfy the following objectives
- To understand the concepts of Knowledge Based System Design
- To understand the components of Knowledge Based Systems
- To understand the issues and approaches in Knowledge Based System Design

Introduction To Knowledge Engineering : The Human Expert And An Artificial Expert – Knowledge Base And Inference Engine – Knowledge Acquisition And Knowledge Representation – Problem Solving Process; Rule Based Systems – Heuristic Classifications – Constructive Problem Solving – Tools For Building Expert Systems - Case Based Reasoning – Semantic Of Expert Systems – Modeling Of Uncertain Reasoning – Applications Of Semiotic Theory; Designing For Explanation – Expert System Architectures - High Level Programming Languages – Logic Programming For Expert Systems - Machine Learning – Rule Generation And Refinement – Learning Evaluation – Testing And Tuning

TEXT BOOKS

1. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education 2007
2. Robert I. Levine, Diane E. Drang, Barry Edelson: " AI and Expert Systems: a comprehensive guide, C language", 2nd edition, McGraw-Hill 1990
3. Jean-Louis Ermine: "Expert Systems: Theory and Practice", 4th printing, Prentice-Hall of India , 2001

REFERENCE BOOKS:

1. Stuart Russell, Peter Norvig: "Artificial Intelligence: A Modern Approach",2nd Edition, Pearson Education, 2007
2. N.P.Padhy: "Artificial Intelligence and Intelligent Systems",4th impression , Oxford University Press, 2007

		L	T	P	C
CS0545	**DATA & KNOWLEDGE MINING**	3	2	0	4
	Prerequisite				
	Nil				

PURPOSE
This course provides a complete overview of Data mining and knowledge mining techniques.

INSTRUCTIONAL OBJECTIVES
By the end of the course, students will be able to
- To understand the concepts of Data Mining

- Classification and prediction and cluster analysis techniques
- Applications of Data and knowledge mining

Introduction To Data Mining – Kind Of Data – Functionalities – Interesting Patterns – Task Primitives – Issues In Data Mining - Data Preprocessing: Why Preprocessing? – Data Summarization – Data Cleaning, Integration, Transformation, Reduction; Mining Frequent Patterns, Associations And Correlations - Basic Concepts – Frequent Item Set Mining Methods – Mining Various Kinds Of Association Rules – Correlation Analysis – Constraint Based Association Mining

Classification And Prediction - Issues Regarding Classification And Prediction – Decision Tree Induction Classification – Bayesian, Rule Based Classification – Support Vector Machine

Prediction: Linear, Non-Linear Regression – Accuracy And Error Measures; Cluster Analysis - What Is Cluster Analysis? Types Of Data In Cluster Analysis – A Categorization Of Major Clustering Methods – Hierarchical Methods – Model Based Methods – Constraint Based Cluster Analysis

Applications And Trends In Data Mining - Data Mining Applications – Products And Research Prototypes – Additional Themes On Data Mining – Social Impacts Of Data Mining – Trends In Data Mining

TEXT BOOK

1. Jiawei Han and Micheline Kamber, " Data Mining – Concepts and Techniques", Second Edition, Morgan Kaufmann Publishers, 2006

REFERENCE BOOKS
1. M. H. Dunham. Data Mining: Introductory and Advanced Topics. Pearson Education. 2001.
2. D. Hand, H. Mannila and P. Smyth. Principles of Data Mining. Prentice-Hall. 2001
3. I. H. Witten and E. Frank. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann. 2000.

SEMESTER – II

		L	T	P	C
CS0540	**SEMANTIC WEB**	3	2	0	4
	Prerequisite				
	CS0545				

PURPOSE

This course introduces semantic web technologies and web services

INSTRUCTIONAL OBJECTIVES

By the end of the course, students will be able to
- To understand the concepts of semantic web technology
- Semantic web services and applications
- RDF,OWL,UDDI,OWL-S,WSDL-S technologies

Traditional web to semantic web – meta data- search engines – Resource Description Framework –elements – rules of RDF – tools- RDFS core elements- Taxonomy and ontology concepts – Web ontology language: OWL – define classes- set operators –enumerations- defining properties – Validating OWL ontology.

Web services – web services standards – web services to semantic web services- UDDI- Concept of OWL-S – building blocks of OWL-S- mapping OWL-S to UDDI- WSDL-S overview

Real world examples and applications : Swoogle- architecture and usage of meta data; FOAF – vocabulary – creating documents – overview of semantic markup – semantic web search engines.

TEXT BOOK
1. Liyang Yu , "Introduction to the Semantic Web and Semantic web services" Chapman & Hall/CRC, Taylor & Francis group, 2007

REFERENCE BOOKS
1. Johan Hjelm, "Creating the Semantic Web with RDF " , Wiley,2001
2. Grigoris Antoniou and Frank van Harmelen, "A Semantic Web Primer", MIT Press

		L	**T**	**P**	**C**
CS0542	**KNOWLEDGE BASED NEURAL COMPUTING**	3	0	3	4
	Prerequisite				
	CS0543				

PURPOSE

This course introduces the representation and extraction of data and rules by applying Neural Networks.

INSTRUCTIONAL OBJECTIVES

By the end of the course, students will be able to
- Neural Network architectures for rule extraction
- Data mining techniques for NN, Decision tree and rule extraction from NN
- Case studies and applications

Architectures and techniques for knowledge based Neurocomputing- Metalevel architecture- Symbolic knowledge representation – Neural Networks- Recurrent Architecture- Automata to Recurrent networks- Extraction of rules from recurrent neural networks- Structural learning methods- learning with forgetting- Prediction of Time series- Adaptive learning- rule extraction and discovery- Transformation of rules to ANN- Integration of Heterogeneous sources of Partial Domain Knowledge- Data Mining techniques for Neural Network: Direct and Indirect Information extraction procedures; - Decision trees from ANN : Extraction of rules from Neural Networks- ANN-DT Algorithm for rule extraction- Case studies – Extraction of Linguistic rules from Data via NN – Neural Knowledge processing in Expert Systems

Practicals

Simulate an XOR function using FF Network
Implement BPN Algorithm
Implement Recurrent Architecture
Implement Adaptive learning in ANN
Extraction of rules from ANN

TEXT BOOK

1. Ian Cloete, Jacek M.Zurada, " Knowledge based NeuroComputing", University Press(India) ,2002

REFERENCE BOOKS

Eyal Kolman , Michael Margaliot ,"Knowledge-Based Neurocomputing: A Fuzzy Logic approach", Springer

		L	**T**	**P**	**C**
CS0544	**AGENT BASED LEARNING**	3	2	0	4
	Prerequisite				
	Nil				

PURPOSE

The course gives a comprehensive understanding on software agents.

INSTRUCTIONAL OBJECTIVES

This course introduces the students to
1. The characteristics of the agents,
2. The design and implementation of Agents
3. The implementation described in the architecture level.

Interacting with Agents - Agent From Direct Manipulation to Delegation - Interface Agent Metaphor with Character - Designing Agents - Direct Manipulation versus Agent Path to Predictable - Agents for Information Sharing and Coordination - Agents that Reduce Work Information Overhead - Agents without Programming Language - Life like Computer character - S/W Agents for cooperative Learning - Architecture of Intelligent Agents - Overview of Agent Oriented Programming - Agent Communication Language - Agent Based Framework of Interoperability - Agents for Information Gathering - Open Agent Architecture - Communicative Action for Artificial Agent - Mobile Agent Paradigm - Mobile Agent Concepts -Mobile Agent Technology - Case Study: Tele Script, Agent Tel

TEXT BOOKS
1. Jeffrey M.Bradshaw, "*Software Agents*", MIT Press, 2000.
2. William R. Cockayne, Michael Zyda, "*Mobile Agents*", Prentice Hall, 1998

REFERENCE BOOKS
1. Russel & Norvig, "*Artificial Intelligence: A Modern Approach*", Prentice Hall, 2nd Edition, 2002
2. Joseph P.Bigus & Jennifer Bigus, "*Constructing Intelligent agents with Java: A Programmer's Guide to Smarter Applications*", Wiley, 1997.

		L	T	P	C
CS0550	**SEMINAR**	0	2	0	1
	Prerequisite				
	Nil				

Students shall be encouraged to choose any latest research topics related to their specialization and present them in the seminar hours.

ELECTIVES FOR FIRST SEMESTER

		L	T	P	C
CS0685	**MULTIMEDIA SYSTEMS**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
> To study the tools and applications of Multimedia Systems

INSTRUCTIONAL OBJECTIVES
- To learn the devices and tools for generating and representing multimedia
- To study the text and images in multimedia
- Learning how to organize the Multimedia Project and building intelligent systems

Multimedia applications – architecture and issues for distributed multimedia systems – multimedia skills – digital audio representations and processing – video technology. Multimedia Hardware & Software. MIDI Vs digital audio – audio file formats - video compression techniques – standardization of algorithms – JPEG image compression – MPEG – DVI technology. Text – Sound – Images – animation - video – project delivering – planning and costing – designing and producing – delivery. Operating system support for continous media applications – middleware system service architecture – multimedia device, presentation services and user interface – multimedia file systems and information model.

TEXT BOOK
1. Tay Vaughan, "Multimedia - Making it work", Tata Mc Graw Hill Edition, 5th edition.

REFERENCE BOOKS
1. Andleigh PK and Thakrar K . "Multimedia Systems Design", Prentice Hall.,1995
2. Walter Worth John .A, "Multimedia Technology and Applications", Ellis Horowood Ltd, 1991
3. Nigel Chapman and Jenny Chapman, "Digital Multimedia", John Wiley & Sons Ltd.,2000
4. John .F. Koegel Buford, "Multimedia Systems", Pearson education.

		L	T	P	C
CS0561	**GEOGRAPHICAL INFORMATION SYSTEMS**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
To understand the Geographical Information Systems and techniques

INSTRUCTIONAL OBJECTIVES:
- To identify, manipulate and analyze spatial data using state-of-the-art software

- To view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and   trends in the form of maps, globes, reports, and charts.

Fundamentals of GIS: What is GIS – Introduction Defining GIS – Components of a GIS – Spatial data – Introduction - Maps and their influence on the character of spatial data – Other sources of spatial data.
Spatial Data modeling: Introduction – Entity definition – Spatial data models – Spatial data structures – Modelling surfaces – Modelling networks – Building computer networks – Modelling the third dimension – modelling the fourth dimension - **Attribute data management** - Introduction – Why choose a database approach? - Database data models – Creating a database – GIS database applications – Developments in databases – Conclusions – Further study- **Data Input and editing**- Introduction – Methods of data input – Data editing – Towards an integrated database - **Data analysis**: Introduction – Measurements in GIS – lengths perimeters and areas – Queries – Reclassification – Buffering and neighbourhood functions – Integrating data – map overlay – Spatial interpolation – Network analysis.- **Analytical modelling in GIS -** Introduction – process models – Modelling physical and environmental processes – Modelling human Processes – Modellintg the decision – making process – Problems with using GIS to model spatial processes - **Output: from new maps to enhanced decisions:** Introduction – Maps as output – Non-cartographic output – Spatial multimedia – Mechanisms of delivery – GIS and spatial decision support .- **ISSUES IN GIS**: The development of computer methods for handling spatial data – Introduction – Handling spatial data manually – The development of computer methods for handling spatial data – The development of GIS - Data quality issues – Introduction – Describing data quality and errors sources of errors in GIS – The further of GIS - Introduction – GIS in the 1990s – Where next for GIS? – Conclusions – Further – References – Glossary – Index.

TEXTBOOK
Ian Heywood, Sarah Cornelius, Steve carver. Introduction to geographical information systems
Pearson Education

REFERENCE BOOKS
1. Lo, C.P. and Yeung, A.K.W. (2002). *Concepts and Techniques of Geographic Information Systems*. Prentice Hall .
2 DeMers, M..N. (1999). Fundamentals of Geographic Information Systems. 2nd Ed., Wiley Press.
3. Burrough, P.A. and R.A. McDonald (1998). *Principles of Geographical Information Systems*. Oxford University Press.

		L	T	P	C
CS0563	**PROFESSIONAL STUDIES**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
This course provides a comprehensive professional development in the context of knowledge engineering

INSTRUCTIONAL OBJECTIVES
At the end of this course, student should be able

- To use text, images, sounds and video to deliver messages and content in meaningful ways
- To apply advanced knowledge to hard skills (the technical abilities) and to soft skills (also called human skills – interpersonal competences, leadership, etc.).

Communications - Peak performance – Identifying and overcoming communication barriers and incompatibilities – The basics of body language - Gathering and Giving Information - Reflective listening of domain experts – Cooperation and commitment – Assertiveness, harmony and persuasiveness – Distinguishing between fact, fantasy, folklore and feelings – Create important documentation - Presentation Skills -   Mastering several different programming languages and presentation tools

Interpersonal Skills - Importance of Interpersonal Skills – Working in a Team – Negotiating - Communications – Ability to Handle Diverse Roles – Leadership - Concept of Leadership – Vision – Motivating - Mentoring Creativity- concept of Creativity – Creativity vs Intelligence – Creative Methods- Conflict Management - Concept of Conflict – Strategies for Conflict Resolution – Mechanism of Resolving Conflicts- Intellectual and Emotional Determinants- Intellectual Development – Intellectual Capacities – Emotional Balance

TEXT BOOK
1. Kris Cole: "Crystal Clear Communication", 2nd Edition, Pearson Education Australia, 2000
2. Dr.T. Bharathi: "Personality Development", Neelkamal Publications, 2008

REFERENCE BOOK
Elizabeth B. Hurlock: "Personality Development", Tata McGraw-Hill, 2006

		L	T	P	C
CS0553	**GENETIC ALGORITHMS & MACHINE LEARNING**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
This course gives a complete understanding of the concepts of Genetic algorithm

INSTRUCTIONAL OBJECTIVES
- Mathematical foundations for Genetic algorithm, operators
- Applications of Genetic Algorithms
- Genetic based machine learning and its applications

Robustness of Traditional Optimization and Search methods – Goals of optimization-GA versus Traditional methods – Simple GA – GA at work –Similarity templates (Schemata) – Learning the lingo - **Mathematical foundations:** The fundamental theorem - Schema processing at work. – The 2-armed & k-armed Bandit problem. –The building Block Hypothesis. – Minimal deceptive problem. Reproduction- Roulette-wheel Selection – Boltzman Selection – Tournament Selection-Rank Selection – Steady –state selection –Crossover mutation – Mapping objective functions to fitness forum. – Fitness scaling. Coding – A Multi parameter, Mapped, Fixed – point coding – Discretization – constraints. **Advanced operators & techniques in genetic search -** Genetic Based Machine learning - The Rise of GBMC – Development of CS-1, the first classifier system. – Smitch's Poker player. – Other Early GBMC efforts. –Current Applications.

TEXT BOOKS
1. David E. Gold Berg, "Genetic Algorithms in Search, Optimization & Machine
    Learning", Pearson Education, 2001
2. S.Rajasekaran, G.A.Vijayalakshmi Pai, " Neural Networks, Fuzzy Logic and Genetic
    Algorithms ", PHI , 2003   (Chapters 8 and 9)

REFERENCE BOOK
1. Kalyanmoy Deb, "Optimization for Engineering Design, algorithms and examples", PHI 1995

<div align="center"><u>ELECTIVES FOR SECOND SEMESTER</u></div>

		L	T	P	C
CS0650	**PATTERN RECOGNITION TECHNIQUES**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
To study the Pattern Recognition techniques and its applications

INSTRUCTIONAL OBJECTIVES
- To learn the basics of Pattern Classifier
- To learn Feature extraction , Classification and Recognition techniques
- To learn recent advances in pattern classification

Pattern recognition, Classification and Description—Patterns and feature Extraction with Examples—Training and Learning in PR systems—Pattern recognition Approaches. Statistical Pattern Recognition—supervised Learning using Parametric and Non Parametric Approaches. Discrete and binary Classification problems—Techniques to directly Obtain linear Classifiers -- Formulation of Unsupervised Learning Problems—Clustering for unsupervised learning and classification. Overview of Syntactic Pattern Recognition—Syntactic recognition via parsing and other grammars–Graphical Approaches to syntactic pattern recognition—Learning via grammatical inference. Introduction to Neural networks—Feedforward Networks and training by Back Propagation—Content Addressable Memory Approaches and Unsupervised Learning in Neural PR.

TEXT BOOK
1. Robert Schalkoff, "pattern Recognition: statistical , structural and neural approaches, John wiley & sons , Inc,1992.

REFERENCE BOOKS
1. Earl Gose, Richard johnsonbaugh, Steve Jost, Pattern Recognition and Image Analysis, Prentice Hall of India,.Pvt Ltd, new Delhi.
2. R.O.Duda, P.E.Hart & D.G Stork, Pattern Classification 2nd Edition, J.Wiley Inc 2001.
3. R.O.Duda & P.E.Hart, Pattern Classification and Scene Analysis, J.wiley Inc, 1973.(Statistical PR)
4. K.S.Fu, Syntactic Pattern Recognition, Academic press Inc,1974.
5. C.M.Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

		L	T	P	C
CS0693	**GRID COMPUTING**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

This course provides a way to understand the Grid computing technology and its applications

INSTRUCTIONAL OBJECTIVES
- Types of Grids and its architecture
- Open Grid Service Architecture and management
- Parallel computing environment, Grid services and applications

Grid Computing values and risks – History of Grid computing – Grid computing model and protocols – overview of types of Grids. Types: Desktop Grids : Background – Definition – Challenges – Technology – Suitability – Grid server and practical uses; Clusters and Cluster Grids; HPC Grids; Scientific in sight – application and Architecture – HPC application development environment and HPC Grids; Data Grids; Alternatives to Data Grid – Data Grid architecture . The open Grid services Architecture – Analogy – Evolution – Overview – Building on the OGSA platform – implementing OGSA based Grids – Creating and Managing services – Services and the Grid – Service Discovery – Tools and Toolkits – Universal Description Discovery and Integration (UDDI). Grid enabling software applications – Needs of the Grid users – methods of Grid deployment – Requirements for Grid enabling software – Grid enabling software applications.
Application integration – application classification – Grid requirements – Integrating applications with Middleware platforms – Grid enabling Network services – managing Grid environments – Managing Grids – Management reporting – Monitoring – Data catalogs and replica management – portals – Different application areas of Grid computing

TEXT BOOK
1. Ahmar Abbas, " Grid Computing , A Practical Guide to Technology and Applications", Firewall media , 2004

REFERENCE BOOKS
1. Joshy Joseph , Craig Fellenstein , "Grid Computing", Pearson Education , 2004
2. Foster , "Grid Blue print foe new computing"

		L	T	P	C
CS0578	**HUMAN INTERFACE SYSTEM DESIGN**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

This course on user Interface Design provides a basic understanding of interface design and principles

INSTRUCTIONAL OBJECTIVES
- Design process management
- Interaction devices and windows strategies
- Managing virtual environments

Goals of System Engineering – Goals of User Interface Design – Motivations of Human factors in Design – High Level Theories –Object-Action Interface Design - Three Principles – Guidelines for Data Display and Data Entry. Managing Design Processes – Direct Manipulation Systems – Interaction devices - Windows Strategies And Information Search

TEXT BOOK

1. Ben Shneiderman , " Designing the User Interface", 3rd Edition, Addison-Wesley, 2001

REFERENCE BOOKS

1. Barfied , Lon ,   "The User Interface : Concepts and Design", Addison – Wesley
2. Wilbert O. Galiz , "The Essential guide to User Interface Design", Wiley Dreamtech, 2002
3. Jacob Nielsen, " Usability Engineering ", Academic Press, 1993.
4. Alan Dix et al, " Human - Computer Interaction ", Prentice Hall, 1993.

		L	T	P	C
CS0572	**DECISION SUPPORT SYSTEMS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

This course enables to study the architecture and implementations of Decision Support Systems

INSTRUCTIONAL OBJECTIVES
- Architecture of DSS
- Modelling and Analysis
- Knowledge based Decision support

DSS Configuration – Characteristics,Components, types of DSS – Three Levels of Management – Requirements for a DSS .Architecture – DSS Hardware Specified Frameworks- Text – Database – Rule Oriented DSS – DSS Development tools – DSS Development process- prototyping- Alternate Development Methodology- Implementation Stage – DSS implementation issues- Future of DSS. Static and Dynamic Models-Treating Certainty, Uncertainty and Risk-Influence Diagrams-Mathematical Models and Optimization – Multidimensional Modeling –Visual Interactive Models –Visual Interactive Simulation – Software Packages – OLAP- Data Warehousing , Access, Analysis, Data Mining and Visualization – Model base Management. Collaborative Computing Technologies – Group Support Systems Group Decision Making – GSS Meeting Process – Distance Learning – Creativity and Idea Generation- Issues of GSS and Collaborative Computing-Enterprise DSS- Concepts and Definition – The evolution of Executive and Enterprise Information Systems – Characteristics and Capabilities of Executive Support Systems – Knowledge Management- Chief Knowledge Officer -Development, Methods, Technologies and Tools – Knowledge Management Techniques for Decision Support. Developing an Artificially Intelligent DSS – Knowledge based DSS for Auditing , Financial Diagnostics , Resource Allocation and Strategic Planning

TEXT BOOKS
1. Efrem G.Mallach , " Decision Support and Data Warehousing Systems", Irwin McGraw Hill 2000
2. Efraim, Turban , Jay E.Aronnon , "Decision Support Systems and Intelligent   Systems", Pearson Education Asia,2000

REFERENCE BOOKS

1. Turban E, " Decision Support and Expert Systems, Management Support Systems ", 4th Edition Maxwell Macmillan , 1995
2. Clyde W.Holsapple , Andrew B.Whinston " Decision Support Systems – A Knowledge based Approach" , West publishing Company ,1996
3. V.S.Janakiraman & K.Sarukeshi , "Decision Support Systems ", PHI, India , 1999

		L	T	P	C
CS0641	**REASONING UNDER UNCERTAINTY**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

This course presents a detailed knowledge of Uncertainty representations, systems and its applications.

INSTRUCTIONAL OBJECTIVIES

- Uncertainty and its representations
- Reasoning with imperfect information
- Application of uncertain systems

Representing Uncertainty - Probability measures – Dempster-Shafer belief functions – possibility measures – ranking functions – relative likelihood - Plausibility measures - choosing a representation - Updating knowledge – probabilistic conditioning – conditioning with sets of probabilities – conditioning inner and outer measures – conditioning belief functions - conditioning possibility measures – conditioning ranking functions – conditioning plausibility measures

Logics for reasoning - Propositional logic – Modal epistemic logic – reasoning about probability – reasoning about other quantitative representations of likelihood – reasoning about knowledge and probability – reasoning about independence – reasoning about expectation – characterizing default reasoning – reasoning about counterfactuals – reasoning using fuzziness - Qualitative Physics – Interval based systems – Abstractions of quantitative systems – Defeasible reasoning – combining and relating formalisms – a general framework – examples of integration and incompleteness –

Applications – Multi Agent Systems - Epistemic frames – probability frames – multi-agent systems – Markovian systems- Protocols – using protocols to specify situations – when conditioning is appropriate – plausibility systems

TEXT BOOK

Joseph Y Halpern, ''Reasoning about uncertainty", MIT Press, 2005

REFERENCE BOOKS

Simon Parsons, "Qualitative methods for Reasoning under uncertainty", MIT Press 2001
Timothy J Ross, "Fuzzy Logic with Engineering Applications", Wiley, 2004

		L	T	P	C
CS0643	**FUZZY EXPERT SYSTEMS AND FUZZY REASONING**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

This course presents a detailed knowledge of Fuzzy logic principles, fuzzy expert systems and its applications.

INSTRUCTIONAL OBJECTIVIES

- Fuzzy sets and representations
- Inference in Fuzzy Expert systems
- Running and debugging Fuzzy Expert systems

Fuzzy Preliminaries - Expert Knowledge- Rules Anteccedent and Consequents – Forward and Backward Chaining – Program Modularization and Blackboard systems – Handling uncertainties in an expert system – Fuzzy Logic and Fuzzy Propositions – Fuzzy Sets – Fuzzy relation – truth value of Fuzzy Propositions – Fuzzification and defuzzification - Fuzzy Sets and Fuzzy Numbers- Algebra of Fuzzy Sets – T norms and T co-norms – Approximate Reasoning – Hedges – Fuzzy Arithmetic – extension principle – alpha cut and interval arithmetic – comparing between fuzzy numbers – Fuzzy Propositions – generalizing AND & OR operators – combining single truth values - combining fuzzy numbers and Membership functions

Inference in Fuzzy Expert System - Types of fuzzy Inference – nature of inference in a fuzzy expert system – monotonic, non-monotonic, downward monotonic inference – test of procedures – modification of existing data

by rule consequent instructions – selection of reasoning type and grades of membership – discrete fuzzy sets – invalidation of data : non-monotonic reasoning – modeling the entire rule space – conventional method – data mining and combs method – reducing number of required rules - running fuzzy expert systems - Debugging tools – Isolating Bugs – data Acquisition from User Vs Automatic data Acquisition – ways of solving one tree search problem – Expert knowledge in Rules – expert knowledge in database – other applications of sequential rule firing – rules that are referable - runaway programs and recursion – Programs that learn from experience - Learning by adding rules – Learning by adding facts – general way of creating new rules and data descriptors – detection of artifacts in input data stream – data smoothing – types of rules suitable for real time work – memory management – development of on-line real time programs – speeding up a program – debugging a real time on line program – case study

TEXT BOOK
 1. William Siler and James J Buckley, "Fuzzy Expert Systems and Fuzzy Reasoning", Wiley Inter-science, 2004

REFERENCE BOOK
1. Timothy J Ross, "Fuzzy Logic with Engineering Applications", Wiley, 2004

<u>**ELECTIVES FOR THIRD SEMESTER**</u>

		L	T	P	C
CS0655	**DATA WAREHOUSING**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
This course enable us to understand the concepts of Data Warehousing and Data Mining
And its applications

INSTRUCTIONAL OBJECTIVES
 • OLTP and Developing a Data Warehouse
 • Data mining techniques and algorithms
 • Data Mining environments and applications

Data warehouse delivery method – system process – typical process flow within a data ware house – query management process – process architecture – meta data -data marting. Design aspects – Designing dimension tables – Designing starflake scheme – Multi dimensional scheme – partitioning strategy aggregations – Data marting- Meta data – System Data warehouse process manager. Hardware and operational design – server hardware, network hardware – parallel technology – security input on design of Hardware – backup and recovery – Service level agreement – Operating the data warehouse. Capacity planning – Estimating the load – Tuning the data warehouse – Assessing performance – Tuning the data load and queries – Testing data warehouse – Development of test plan – Testing the data base and operational environment. Data Mining Environment: Case studies in building business environment, Application of data ware housing and Data mining in Government, National Data ware houses and case studies.

TEXT BOOK
1.   Sam Anabory & Dennis Murray , "Data Warehousing in the real world", Addison Wesley, 1997.
2.   C.S.R. Prabhu , "Data Ware housing: Concepts, Techniques, Products and Applications", Prentice Hall of India, 2001. (Unit V)

REFERENCE BOOKS
   1.   J.Han, M.Kamber , "Data Mining: Concepts and Techniques", Academic Press, Morgan
               Kanf man Publishers, 2001.
   2.   Pieter Adrians, Dolf Zantinge, "Data Mining", Addison Wesley,2000.
   3.   Seidman,, "Data Mining with Microsoft SQL Server", Prentice Hall of India,2001.
   4.   Berry and Lin off , "Mastering Data Mining: The Art and Science of Customer
               Relationship Management", John Wiley and Sons, 2001
   5.   David Hand, Heikki Mannila, Padhraic Smyth, "Principles of Data Mining", PHI, 2004

		L	T	P	C
CS0683	**SPEECH AND LANGUAGE PROCESSING**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
This course provides a thorough understanding of speech and language processing techniques

INSTRUCTIONAL OBJECTIVES
- Basics of Speech technology, parsing
- Presentation and semantic analysis of speech
- Machine translation

Introduction – Regular Expressions and Finite State Automata – Morphology and Finite State Transducers – Computational Phonology and Text to speech - N-grams : Counting words in Corpora – Simple N- grams – Smoothing – Entropy - HMMS and Speech Recognition: Speech Recognition Architecture – Overview of HMM – Advanced Methods for decoding – Training a speech Recognizer – Human Speech Recognition –
 Part of Speech Tagging – Rule Based, Stochastic Part-of-Speech Tagging – Transformation Based Tagging
Context Free Grammars for English – Context Free Rules and Trees – Sentence Level Constructions- Coordination – Agreement – Grammars and Human Processing - Parsing with Context Free Grammars – Top down Parser – Problems with Basic Top Down Parser – Finite State Parsing Methods - Representing Meaning: Computational Desiderata for Representations – Meaning Structure of Language – First Order Predicate Calculus - Semantic Analysis: Syntax driven Semantic Analysis – Attached for a Fragment of English- Integrating Semantic Analysis into the Earley Parser, Robust Semantic Analysis - Dialogue and Machine Translation: - Dialogue Acts – Automatic, Plan inferential, Cue based Interpretation of Dialogue Acts – Dialogue Structure and coherences – Dialogue Managers - Language Similarities and Differences – The Transfer Metaphor – The Interlingua Idea- Direct Translation – Using Statistical Techniques – Usability and System Development

TEXT BOOK
1. D. Jurafsky and J. Martin ," Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Pearson Education, 2004

REFERENCE BOOKS
1. C. Manning and H. Schutze ,"Foundations of Statistical Natural Language Processing" Massachusetts Institute of Technology, 2003
2. James Allen. *Natural Language Understanding*. The Benajmins/Cummings Publishing Company Inc. 1994. ISBN 0-8053-0334-

		L	T	P	C
CS0663	**DEDUCTIVE AND INDUCTIVE REASONING**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
This course presents a detailed knowledge of principles of deductive and inductive reasoning, fallacies and their applications.

INSTRUCTIONAL OBJECTIVIES
- Definitions and approaches to Deductive Reasoning
- Inductive methods and their fallacies
- Applications of deductive and inductive reasoning

Some definitions of formal logical concepts- Classical symbolic logic – symbolic representation of language statements – formal logical rules of inference – semantics in formal logic – provability relation – does formal logic model human reasoning – mental model theory – revised model theory of conditionals - Non-monotonic logic - categorization and default reasoning – minimal model semantics-default entailment relation – some characteristic of belief - biases in human reasoning – the representativeness heuristics and the availability

heuristics – Atmosphere effect – effects of negation - Introduction – Affirming the consequent and denying the antecedent – errors in the interpretation of standard form categorical propositions – fallacies due to ambiguity of language - language nuances associated with conditional statements – conditional inferences made of 'only if' statements - ordinary languages Vs formal language definitions of quantifiers - Nature of Inductive inference – method of agreement – method of difference – method of residues – method of concomitant variations – argument from analogy – Imperfect applications of Inductive methods – relation of induction to deduction and verification - Fallacies of generalization – Fallacies of non-observation – False analogy – interpreting asymmetries of projection in Children's inductive reasoning - use of single or multiple categories in category based induction – abductive inference from philosophical analysis to neural mechanisms

TEXT BOOK
1. Thomas Fowler " Logic: Deductive and Inductive", Adamant Media Corporation 2004.
2. Theses by Monique Van der straaten, 2003

REFERENCE BOOK
1. Aidan Feeney and Evan Heit, "Inductive Reasoning: Experimental, developmental and Computational approaches, Cambridge University Press, 2007

		L	**T**	**P**	**C**
CS0665	**BIOINFORMATICS**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE
To explore how biological information could be stored in digital form to create bioinformatics resources and to process it.

INSTRUCTIONAL OBJECTIVES
1. Different coding techniques and standards, biological web resources available
2. To analyze DNA and Protein sequences
3. To understand protein classification and Structure prediction

What is Bio-Informatics – Overview- Major databases in Bio Informatics- Molecular biology – Central Dogma-Data retrieval tools – Gene Analysis – Prokaryotic and Eukaryotic Genomes – Sequence Assembly – Gene mapping – Physical maps – cloning – ORF – amino acids – DNA, RNA sequences – Genetic code - DNA: working with single DNA sequence : removing vector sequences- verifying restriction maps – PCR design – GC content – counting words – internal repeats – protein coding regions – ORFing – Genomescan Protein: predicting properties – primary structure analysis – transmembrane segments – PROSITE patterns – interpreting scanprosite results- finding domains – CD server results – pfscan results. – Alignment of Pair of Sequences - Terminology – Global and Local alignment – Dot matrix – dynamic programming – using scoring matrices – PAM matrices – BLOSUM. - Working with FASTA – Algorithm – output – E-values – Histogram.
Working with BLAST – algorithm – output – services – gapped BLAST- PSIBLAST – comparison of FASTA and BLAST. - Multiple sequence alignment - Criteria for Multiple sequence alignment – applications – choosing the right sequences; FASTA, ClustalW, TCoffee methods – interpreting multiple sequence alignment – getting in right format – converting formats – using Jalview – preparing for publication. - Protein Classification & Structure Prediction **-** Structure of amino acids – primary structure – secondary structure – folds and motifs – alpha and beta helix – structure based protein classification – protein structure Data bases – folding problem – PROPSEARCH – primary structure analysis and prediction – secondary structure analysis and prediction – motifs – profiles – patterns and fingerprints

TEXT BOOKS
1. S.C Rostogi , Mendiratta, P.Rasogi, " *BioInformatics: methods and applications*",second edition, PHI 2006.
2. Jean Mickel Clavere & Cadrienotredom "*Bio Informatics– A beginners guide*" Wiley DreamTech, 2003.

REFERENCE BOOKS
1. T.K. Attwood and D.J Perry Smith, " *Introduction to Bio Informatics*", Pearson Education, 1st Edition, 2001.
2. Dan E.Krane, Michael L.Raymer, "*fundamental concepts of BioInformatics* ", Pearson Education, 2004.

		L	T	P	C
CS0681	**MACHINE VISION**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
This course deals with complete understanding of Computer Vision techniques

INSTRUCTIONAL OBJECTIVIES
- Image processing basics
- 2D and 3D vision fundamentals
- Segmentation, Clustering and Recognition

Image Formation - Cameras – lenses, projections, sensors - Radiometry – light and surfaces - Representation – color spaces – Calibration – Strong Weak - 2D Vision
Filters - Binary Images - Features - Edge Detection – Texture – Shape - Segmentation
Clustering - Model Fitting – Probabilistic - 3D Vision - Multiview geometry - Stereo
Shape from X - 3D data - Dynamic Sequences - Optical Flow - Structure from Motion
Tracking - Kalman Filter based – Condensation - Recognition – Representations - Appearance Based

TEXT BOOKS
1. David Forsyth and Jean Ponce , "Computer Vision – A modern approach "Prentice Hall,2002
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, " Image Processing, Analysis and Machine Vision",
   Thomson 2007

		L	T	P	C
CS0673	**SOFTWARE REUSE**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
This course explains the various developments and metrics used in development of software reusable components

INSTRUCTIONAL OBJECTIVES
- Metrics used in software reusable components
- Development of reusable components
- Reuse in business

Software Reuse success Factors- Change in process - Change in Organization-set of Principles- Reuse Cost effective-software Engineering Processes- Establishing & Managing a Reuse business.
Transform requirement into code- Use Case model-Analysis model-Design model-Implementation Model-Test Model-Application and Component Systems- Layered Architecture. Use case Components-Structure the use case model to ensure component reuse- Reusing Component to build the use case model-Design the use case components for effective reuse-Expressing use case Variability- Packaging & Documenting use case components objects Components. Object-oriented Business Engineering-Applying Business Engineering-Applying Business engineering to Define process & organization- Application family Engineering. Organizing a Reuse Business- Transition to a Reuse Business- Managing the reuse business –Making the reuse Business work.

TEXT BOOK
1. Ivar Jacobson, Martin Gres, Patrick Johnson, "Software Reuse", Pearson Education, 2004.

REFERENCE BOOKS
1. Even-Andre Karisson, " Software Reuse - A Holistic Approach ", John Wiley and Sons, 1996.
2. Karma McClure, " Software Reuse Techniques - Additional reuse to the systems development process ", Prentice Hall, 1997.

		L	T	P	C
CS0546	**SPATIO TEMPORAL REASONING**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
This course presents a detailed knowledge of Spatial and temporal based reasoning techniques and their applications.

INSTRUCTIONAL OBJECTIVIES
- Spatial reasoning and representations
- Temporal problems and solutions
- Applications of spatio-temporal reasoning

Aspects Of Spatial Representation - What is knowledge representation – what is so special about spatial – Qualitative, quantitative and hybrid approaches – frame of reference – points vs. extended objects- Points of view on spatial relations – granularity and vagueness – overview of extant approaches – topology – orientation – size and distance – shape - Reasoning With Spatial Representations - Role of domain structure – transforming frames of reference – composition of spatial relations – topological relations – orientation – distance – constraint propagation and relaxation – Applications – GIS – Conceptual design in 2D and 3D – emerging trends and technologies - Simple Temporal Problem - Problem representations and solutions – minimal network – Complexity – solution techniques – Floyd's and Warshall's algorithm – Bellman and Ford's algorithm – Johnson's algorithm – directed path consistency – partial path consistency - TCSP AND DTP - Examples – Definition – the temporal constraint satisfaction problem – The disjunctive temporal problem – object level and meta level – Complexity – Preprocessing – path consistency – upper lower tightening – loose path consistency - Solving TCSP – standard backtracking – improvements - solving DTP - Stergiou's and Koubarakis' algorithm - Improvements

Applications - A generic model for spatio-bi-temporal geographic Information – process dynamics, temporal extent and casual propagation as the basis for linking space and time – relationship between geographic scale, distance and time as expressed in natural discourse – acquiring spatio-temporal knowledge from language – analyzing temporal factors in urban morphology development-The cognitive atlas – using GIS as a metaphor for Memory

TEXT BOOKS
1. Max J Egenhofer and Reginald G Golledge, "Spatial and Temporal reasoning in Geographic Information Systems", Oxford University Press, 1998.
2. Handbook of Temporal reasoning in Artificial Intelligence, Ed Michael Fisher, Dov M Gabbay, Lluis Vila, Springer, 2005.
3. Reference notes by Daniel Hernandez and Amitava Mukherjee, Leon Planken

		L	T	P	C
CS0562	**DIGITAL IMAGE PROCESSING**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
This course provides a complete understanding of the various image processing techniques

INSTRUCTIONAL OBJECTIVES
- Image fundamentals and techniques
- Image transforms, enhancement , restoration and compression
- Image reconstruction operations

Steps in Digital Image Processing – Components; Elements of Visual Perception – Image sensing and Acquisition – Image Sampling & Quantization – Lloyd Maz Quantizer – Dither – Color images- Matrix theory – Relationships between pixels. Image Enhancement - Spatial Domain - Frequency Domain. Noise models – mean filters – order – statistics – Adaptive filters – Band reject – Band pass – Notch – Optimum notch filtering –

Wiener filtering. – Compression models – Information theory – error free compression – Lossy compression – Compression standards. Point detection – Line detection – Edge detection – Boundary detection – Thresholding – Region-based segmentation; Representation – Boundary descriptors – Regional descriptors

TEXT BOOK
1. Gonzales Rafael , Richard E.woods, "Digital Image Processing", 2nd edition , Pearson Education 2004

REFERENCE BOOKS
1. Anil Jain K. "Fundamentals of Digital Image Processing", PHI, 1999.
2. William Pratt , "Digital Image Processing", Wiley Interscience, 2nd edition 1991

			L	T	P	C
CS0689	**EMBEDDED TECHNOLOGY**		**3**	**0**	**0**	**3**
	Prerequisite					
	Nil					

PURPOSE
To study the architecture of microcontrollers and embedded microcomputer systems.

INSTRUCTIONAL OBJECTIVES
- To understand the architecture of PIC microcontroller
- To understand the architectures and applications of embedded microprocessor based systems.
- To know cross compilers and debugging strategies
- To understand the basic design issues of real time OS

Embedded Hardware: Gates – Timing Diagram – Memory – Microprocessor – Buses – Direct Memory Access – Interrupts – Built ins on the Microprocessor – Convention Used on Schematic – Schematic – Interrupts Microprocessor Architecture – Interrupt Basics – Shared Data Problem – Interrupt Latency. PIC Controller : Serial EEPROM – Analog to Digital Converter – UART – Baud Rate - Motorola MC68H11 Family Architecture – Registers – Addressing Modes Programs – Interfacing Methods, Interrupts– Interrupt Service Routine – Features of Interrupts – Interrupt Vector – Priority –Serial I/O Devices – RS 232, RS485. Round Robin – Round Robin with Interrupts – Function – Queue Scheduling Architecture & Algorithms. Real Time OS: task & Task States – Tasks & Data – Semaphores & Shared Data – Operating System Services – Message Queues – Timer Functions – Event Memory Management – Interrupt Routines & RTOS Environment – Basic design Using RTOS.

TEXT BOOKS
1. David E. Simon , "An Embedded Software Primer",Pearson Education,2004.
2. John B Peatman , "Design with PIC Microcontroller",Pearson Education Asia, 1998. (Unit II)
3. Jonartthan W. Valvano, "Embedded Micro Computer System:Real Time Interfacing",Thomson Learning, 2001. (Unit III)

REFERENCE BOOKS
1. Burns, Alan & Wellings , "Real Time Systems & Programming Languages",2nd Edition,1997.
2. Grehan Moore & Cyliax , "Real Time Programming: A Guide to 32 bit Embedded Development" ,Addison Wesley, 1998.
3. Heath Steve, "Embedded System Design", Newnes ,1997.