

KADI SARVA VISHWAVIDHYALAYA

**M PHIL IN COMPUTER SCIENCE
AND INFORMATION TECHNOLOGY
SYLLABUS**

(Effective from june 2009)
Mphil Semester I from june 2009
Mphil Semester II from jan 2010

MPHIL IN COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Duration	:	1 year (2 semesters)
Intake	:	20
Fees	:	Rs. 30,000 /per year
Teaching/ Learning Days:		Saturday - 4hrs Sunday - 6hrs
Teaching Load:		10 hrs/week (Per semester: 220 hrs)

KADI SARVA VISHWA VIDYALAYA
SCHEME FOR M.PHIL. PROGRAM IN COMPUTER SCIENCE AND
INFORMATION TECHNOLOGY

SEMESTER – I (MPhil) Applicable From 1st August to 30th December

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
1	MPCS-01	Research Methodologies for Quality ,relevant and consistent research	2	-	100	-
2	MPCS-02	Data Warehousing and Data Mining	2	2	70	30
3	MPCS-03	Web Technologies and Services	2	2	70	30
		TOTAL	6	4	240	60

Theory Examination to be taken by University for the following subjects- MPCS-01 to MPCS-03(ALL)
 Practical Examination to be taken by University for the following subjects- MPCS-02 , MPCS-03

SEMESTER – I (MPhil) Applicable From 1st January to 30th May

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
1	MPCS-04	Elective-I	1	2	100	50
2	MPCS-05	Elective-II	1	2	100	50
3	MPCS-06	Project Work	-	4	-	400
		TOTAL	2	8	200	500

Theory Examination to be taken by University for the following subjects- MPCS-04 , MPCS-05
 Practical Examination to be taken by University for the following subjects- MPCS-04 to MPCS-06(ALL)

INSTRUCTION STRATEGIC

1. The program will run Saturday 4.00 pm to 8:00 pm and Sunday 9:00 am to - 4:00 pm
Semester I: 1st August to 30th December (includes examination)
Semester II: 1st January to 30th May (includes examination)
Result Declaration: 2nd week of June
2. The program participant has to work 20 hrs per week on self learning methodologies to add value to 10 hrs of teaching learning provided at university.
3. For every subject 10 % of the syllabus is cosigned as self-study. Self-study work is to be documented by the students as term-work assignment which will be also an object of evaluation.
4. For every subject the program participant has to develop documentation which will include concept, illustration, methodologies per diversified application and one prototype is to be developed by participant in the lab work.

Semester Ist

Sr.No.	Name of Course	Teaching / Learning Scheme
MPCS-01	Research Methodologies for Quality ,relevant and consistent research	2 Th
MPCS-02	Data Warehousing and Data Mining	2Th + 2 Labs
MPCS-03	Web Technologies and Services	2 Th + 2 Labs

Semester IIst

Sr.No.	Name of Course	Scheme of Credits
MPCS-04	Elective I	1Th + 2 Labs
MPCS-05	Elective II	1 Th + 2 Labs
MPCS-06	Project Work	4 Labs

ELECTIVE I

- a. **Software Technologies – Service Oriented Architecture , Software quality , Software Testing ,Enterprise Application Integration**
- b. **High performance computing cluster and grid computing**
- c. **Knowledge Management Techniques**
- d. **Digital Image Processing and Multimedia Systems**

ELECTIVE II

- a. **Advanced Networking and Security Systems**
- b. **Biometric Authentication Systems and Embedded Systems
Interdisciplinary sciences and technologies**
- c. **Next Generation heterogeneous**

SEMESTER-I

MPCS-01 RESEARCH METHODOLOGY

Rationale (Course Objective) :

This course provides a deep and systematic understanding of the nature and conduct of Computer Science research and equips students with the ability to undertake independent research and to enhance existing transferable key skills and to develop high-order transferable key skills.

Learning Outcomes:

Student should learn:-

1. To understand research and research methods in Computer Science;
2. To be able to plan, and conduct your own research, taking into account ethical, legal, and professional limitations;
3. To be able to communicate its results

Instruction Strategies:

Generally lecture method would be applied for classroom teaching

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
1	MPCS-01	Research Methodologies	2	-	100	-

Course Content:

1 Research Overview

Meaning of Research – Objectives of Research – Motivation in Research – Types of Research – Research Approaches – Significance of Research – research Methods versus Methodology – Research and Scientific Method – Importance of Knowing How Research is done – Research Process – Criteria of good Research – Necessity of Defining the Problem – Technique involved in Defining the Problem – Meaning of Research Design – Need for Research Design – Features of a Good Design – Important Concepts Relating to Research Design – Different Research Design – Data

2 Data Analysis

- Mathematical and statistical analysis using software tools like MAT Lab, SPSS or free wares tools.
- Report writing and analyzed data representation - Significance of Report Writing – Different Steps in writing Report – Layout of the Research Report – Types of Reports – Oral Presentation – Mechanics of Writing a research Report – Precautions for Writing Research Reports.

3 Quality Research Strategies

- Building expertise in the areas of interest, generating the base content in the selected area, literature survey for research work- already done, being done by others and arriving at directions of research.
- Formulation of research title , development of criteria based research proposal , Presentation for the research proposal and review of the proposal base on the feedbacks by evaluation experts.

- Planning for the research work with outcomes/achievable and time targets.
Research monitoring publication of research outcomes in referred journals.
Documentation of research work to generate thesis with norms and standards.

REFERENCE:

1. "Thesis & Assignment Writing" By Anderson, Berny H. Dujrston, H. Pode, Wiley Eastern Ltd., New Delhi, 1970.
2. MAT LAB Programming By Y. Kirani Singh and B. B. Chaudhuri, PHI
3. Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education 2003.
4. Quantitative Data Analysis in Education: A Critical Introduction Using SPSS - By by Paul Connolly
5. Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, "Introduction to algorithms" Prentice Hall 1990.
6. "Research Methodology" R. Panneerselvam, PHI, New Delhi 2005
7. Intelligent data analysis: an introduction

MPCS-02 DATA MINING AND DATA WAREHOUSING

Rationale (Course Objective) :

This Course has been designed to provide students with enough knowledge to extract data from large databases. The different algorithms provide knowledge to the student regarding the process of Knowledge discovery & data mining which is one of the emerging fields of Information Technology.

Learning Outcomes:

- Make more effective use of data stored in databases
- Create a clean, consistent repository of data within a data warehouse
- Utilise various levels and types of summarisation of data to support management decision making.
- Discover patterns and knowledge that is embedded in the data using several different techniques, such as neural nets, decision trees and statistical techniques.

Instruction Strategies:

Generally lecture method would be applied for classroom teaching. Application of data mining and data warehousing on real-world problems would be emphasized.

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
2	MPCS-02	Data Warehousing and Data Mining	2	2	70	30

Course Content:

1 Introduction: Fundamentals of data mining

- Data mining Functionalities,
- Classification of Data Mining Systems,
- Major issues in Data Mining,
- Data Warehouse and OLAP Technology for Data mining
- Data Warehouse, Multidimensional Data Model,
- Data Warehouse Architecture, Data Warehouse implementation,
- Development of Data Cube Technology,

2 Data Preprocessing, Data Mining Primitives, Languages, and System Architectures

- Needs Preprocessing the Data,
- Data Cleaning, Data Integration and Transformation,
- Data Reduction, Discretization and Concept Hierarchy Generation.
- Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on Data Mining Query Language Architectures of Data Mining Systems.

3 Concepts Description and Mining Association Rules

- Characterization and Comparison: Data Generation and Summarization
- Bases characterization, Analytical Characterization: Mining Class Comparisons
- Association Rule Mining,
- Rules from Relational Databases and Data Warehouses

4 Classification , Prediction and Cluster Analysis Introduction

- Issues Regarding Classification and Prediction,
- Classification by Decision Tree , Classification by Backpropagation, Classification Based on Concepts from Association Rule Mining
- Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density , Based Methods
- Grid Based Methods, Model – Based Clustering Methods, outlier analysis. Multidimensional Analysis and Descriptive

5. Mining Complex Types of Data

- Mining of Complex, Data Objects, Mining Spatial Databases
- Mining Multimedia Databases
- Mining Time – Series and Sequence Data, Mining Text Databases,
- Mining the World Wide Web.

REFERENCE:

1. Data Mining - Concepts and Techniques - JIAWEIHAN & MICHELINE KAMBER Morgan Kaufmann publishers.
2. Data Ming Techniques – ARJUN K PUJARI, Universities Press.
3. Data Warehousing in the Real world SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.

MPCS-03 WEB TECHNOLOGIES AND SERVICES

Rationale (Course Objective) :

- The primary objective is to impart knowledge about Web Technologies and their implementation. This course also teaches the students to develop dynamic web page using HTML, DHTML, JSP and Servlets. To give practical approach to different Advanced Java Technologies.

Learning Outcomes:

At the conclusion of the course, students will able to:

- Identify the main features and architecture of the J2EE platform
- Compare/contrast Java networking options including JDBC.
- Implement client/server applications using sockets and datagram
- distributed computing environment
- Developing Java Beans.

Instruction strategies:

To fulfill the aim of the subject, theory as well as practical sessions will be conducted. The act of learning can be improved by using audio-visual aids like OHP and LCD projector. Apart from this, regular seminars will also be conducted.

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
3	MPCS-03	Web Technologies and Services	2	2	70	30

Course Content:

1 HTML ,DHTML and Scripting Language

- Common tags – HTML Tables and formatting internal
- linking – Complex HTML forms.
- Java Scripts – Control structures
- DHTML – CSS – event model – filters & transitions.

2 Applets and AWT Programming

- Review of Applets, Class, Event Handling,
- AWT Programming.
- Introduction to Swing: Japplet, Handling Swing Controls
- Tables, Differences between AWT Controls & Swing Controls
- Developing a Home page using Applets & Swing. Multi-Threading and RMI.

3 Java Beans and Servlets

- Introduction and Advantages of Java Beans
- BDK, Introspection, Using Bound properties, Bean Info Interface
- Constrained properties, persistence, Customizers, Java Beans API
- Life Cycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package
- Reading Servlet parameters, Reading Initialization Parameters
- The javax.servlet HTTP package, Handling, Http Request & responses
- Using Cookies – Sessions Tracking, Security Issues.

4 JSP

- Introduction to JSP: The Problem with Servlets, The Anatomy of a JSP Page,
- JSP Processing, JSP Application Design with MVC. Tomcat Server & Testing Tomcat.
- JSP Application Deployment

5 JDBC

- Database Access, Database Programming using JDBC,
- Studying javax.sql.* package.
- Accessing a Database from a JSP Page.

REFERENCE:

1. Internet and World Wide Web – How to program by Dietel, and Nieto Pearson Education Asia. (Chapters: 3,4,8,9,10,11,12-18).
2. The Complete Reference Java 2 third Edition by Patrick Naughton and Herbert Schildt. (Chapters: 19,20,,21,22,25,27).
3. Java Server Pages by Hans Bergstan. (Chapters: 1-9).

SEMESTER-II

MPCS-05 ELECTIVE I

(A) SOFTWARE TECHNOLOGIES

Rationale (Course Objective) :

The course covers performance related issues of software which checks dependability of software component, subsystem and systems. It describes, how qualitatively software performance can be enhanced by using dependable software. It also covers issues related to software system, their control, quality perspective and means to achieve high performance software using static and dynamic methods of qualifying software for critical application. This course also covers the knowledge on enterprise –wide business process integration. Design aspects of Enterprise systems. Coverage of course are Service Oriented ARCHITECTURE, Software quality , Software Testing ,Enterprise APPLICATION INTEGRATION

Learning outcomes:

On successful completion of this module, students should be able to:

- Understand how quality issues affect each aspect of the software development life-cycle
- Understand the concepts of service oriented architecture
- Design and implement web services and other service oriented applications
- Know appropriate strategies for software testing and validation and how to implement them
- Implement a software quality assurance plan
- Relate quality to the current standards for process improvement.

Instructional Strategies:

To fulfill the aim of the subject, theory lecture would be applied for classroom teaching. Apart from these regular seminars and case studies will also be conducted.

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
2	MPCS-05	Elective-II	1	2	100	50

Course Content:

1. Software Management Concept

- Software process
- Software project Metrics
- Software project Planning
- Risk Management

2. Software Quality Assurance

- Quality Concepts
- Quality Movement
- Software Review
- Software Quality Assurance
- Formal Technical Reviews

3. Software Testing

- Software Testing Fundamentals
- Test Case Design
- Basic path Testing
- Control Structure Testing
- A Strategic approach to software

4. Enterprise Application Integration

- Concepts and challenges of integrating different application
- Different heterogeneous platform
- EAI architecture , EAI approaches data level
- Application / process level , method level

5. Messaging concepts and services

- Messaging concepts and various types of messaging services
- Middleware and adapter services , Transaction middle aware
- EAI process methodology

REFERENCES:

Software Engineering – Roger S.Pressman , fifth edition, Mc Graw hill.

(B) HIGH PERFORMANCE GRID AND CLUSTER COMPUTING

Rationale (Course Objective) :

This course supplies an introduction to the basic technologies of and programming techniques for Grid and Cluster computing. Standard techniques for developing parallel solutions or high throughput solutions to problems will be introduced and implemented. Software systems that provide high-level abstractions for data communications and services will be considered within the Web 2.0 model.

Learning Outcomes:

- Discuss some of the enabling technologies e.g. high-speed links and storage area networks for building computer grids.
- Explain the use of some of the grid computing and clustering middleware used to implement virtual super computers.
- Explain programming toolkits such as Parallel Virtual Machine (PVM) and Message Passing Interface (MPI) for writing parallel computer applications.
- Explain HPC Portals, peer-to-peer (P2P) networking and semantic grids.
- Elaborate some of the significant grid computing areas of application e.g. Bio-Technology, eHealth and eMedicine, Finance, and Computer Networks.

Instruction Strategies:

To fulfill the aim of the subject, theory as well as practical sessions will be conducted. Apart from these regular seminars will be conducted.

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
2	MPCS-05	Elective-II	1	2	100	50

Course Content:

1 Introduction and remote computing model

- Cluster to grid computing, grid models, mobile grid models applications
- Definitions of Grid Computing and its Taxonomy
- Anonymous remote computing model
- Issues in parallel computing on interconnected network, existing distributed computing approach,
- ARC model of computation, two tier Arc language constructs, Classifications of Grids

2 Grid Service Architecture and Application

- The Open Grid Services Architecture (OGSA),
- Creating and Managing Grid Services,
- Web Services and Utility Computing, Grid-Enabling Software Applications
- Application Integration, Grid-Enabling Network Services
- Management of Grid Environments, Grid-enhanced Applications in Research and Industry

3 Design and implementation of the Grid model

- model, design and implementation of the model,
- Parallel simulated Annealing Algorithms , simulated annealing technique, clustering algorithm for simulated annealing Services and Protocols:
- Scheduling and Resource Management, Security, Data Handling, Quality of Service, Monitoring, Information Services, Open Grid Services Architecture

4 Distributed and Cluster computing

- Distributed and Cluster (HPC/HTC) computing principles,
- Parallel computing models: Message passing, Remote procedure calls, Shared memory models.

5 Cluster computing

- Cluster computing : hardware and software configuration, job scheduling,
- MPI , Performance and benchmarking, Standard parallel algorithms
- Parallel I/O storage technologies, Load balancing and scheduling
- Appropriate applications.

REFERENCE:

- Grid Computing by D Janakiram
- Grid Computing: Making The Global Infrastructure a Reality (Hardcover)
- The Grid: Core Technologies by Maozhen Li, Mark Baker
- Grid Computing: The Savvy Manager's Guide by awel Plaszczak and Rich Wellner
- Parallel Programming in C with MPI and OpenMP, by Michael Quinn, McGraw-Hill Higher Education, ISBN: 0072822562, 2004.
- Foundations of Multithreaded, Parallel, and Distributed Programming, by Gregory R. Andrews, ISBN: 0201357526, Addison Wesley, 2000.
- Introduction to Parallel Computing, by Ananth Grama, ISBN: 0201648652, Addison Wesley, 2003.

C) KNOWLEDGE MANAGEMENT SYSTEMS

Rationale (Course Objective) :

The focus of this subject is not only on Fundamental definitions of knowledge and strategy, but on more practical applications of KM tools and technologies in industry.

- Explain the basic knowledge representation, problem solving.
- Assess the applicability, strengths, and weaknesses of the basic knowledge Representation, problem solving, and learning methods in solving particular Engineering problems

Learning Outcomes:

By the end of this unit students will have knowledge and skills to:

- Understand organizational contexts of technological infrastructures and emerging technological frameworks for electronic information and knowledge management systems, including intranet and Internet environments;
- Appreciate the capabilities and limitations of many products on the information and knowledge management systems market and how to use implementation strategies to maximize their strengths and minimize their weaknesses;
- Identify and select from appropriate strategic options for designing and implementing an information and knowledge management system;
- Develop intelligent applications

Instructional Strategies:

To fulfill the aim of the subject, theory as well as practical sessions will be conducted. The act of learning can be improved by using audio-visual aids like OHP and LCD projector. Apart from these regular seminars and case studies will also be conducted.

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
2	MPCS-05	Elective-II	1	2	100	50

Course Content:

- 1 Overview of KM**
Scope and significance, techniques, difficulties (Road Map), implementation, KM and sharing, types of KM, Principles, dynamics.
- 2 Drivers of KM**
Pillars of KM, Seven Layers, critical success factors.
- 3 Essence of information technology**
Knowledge Economy, context, Association of KM with e-comm, customer relationship management, total quality management, benchmarking and reassurance of KM.
- 4 KM implementation strategies**
Digital dash board, Web storage system, wireless solutions, intelligent interfaces.
- 5 Case Studies**
A study and development of minimum one KM initiatives of different organizations for problem solving, conflict resolution and facing turbulence through KM.

REFERENCE:

- Knowledge Management [Tools for business development] by Dr. B. Rathan Reddy; himalaya publishing house.
- Knowledge Management Strategies, by Jerry Honeycutt; Prentice-Hall of India.
- Sowa J. F., Knowledge Representation: Logical, Philosophical, and Computational Foundations, Brooks Cole Publishing Co., 1999.
- Gonzalez A. J., and Dankel D. D., the Engineering of Knowledge-Based Systems, Prentice Hall, 1993.

(D) DIGITAL IMAGE PROCESSING AND MULTIMEDIA

Rationale (Course Objective) :

This course contains Introduction to concepts of digital image processing and their applications, Digital Image Fundamentals; image sampling and quantization ,Image Enhancement; histogram processing; image smoothing and sharpening, Image Transforms; spatial frequency concepts; Fourier transform and its fast implementation.

Learning Outcomes:

- Introduce fundamental principles and techniques for digital image processing;
- Provide hands-on experience in using software tools for processing digital images
- Implement image processing algorithms in software.
- Create their animation films using Multimedia tools and also by applying the computer Graphics algorithm

Instructional Strategies:

- Generally lecture method will be adapted.
- Teaching aids such as OHP and LCD projectors will be used.
- Emphasis on self study will be handled through seminars,

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
2	MPCS-05	Elective-II	1	2	100	50

Course Content:

1 Digital Image fundamentals and Image Transforms

- Introduction, An image model, sampling & quantization,
- Basic relation ships between Pixels, imaging geometry
- Properties of 2 – D Fourier transform,
- FFT algorithm and other separable image transforms.
- Walsh transforms. Hadamard, Cosine, Haar, Slant transforms,
- KL transforms and their properties.

2 Image Enhancement amd Image filtering

- enhancement by point processing, histogram processing, spatial filtering and enhancement in frequency domain, color image processing.
- Image filtering and restoration :Algebraic approach to restoration, inverse filtering,least mean squares and interactive restoration, geometric transformations.

3 Image compression and segmentation

- Image compression modes, error free compression, lossy compression, image compression standards.
- Detection of discontinuities, edge linking and boundary detection thresholding, region – oriented segmentation, use of motion in segmentation.
- Representation and description: Various schemes for representation, boundary descriptors and regional descriptors.
- Image reconstruction from Projections, Radon Transforms; Convolution/Filter back – Project Algorithms.

4 Multimedia System

- Project design: setting up, requirements, navigation, storage, delivery
- Authoring tools: history, comparison of different approaches, functionality and principles
- Case study: Adobe Flash - Applications (eg. kiosks, distance learning, web-based)

5 Auditory input and output

- Auditory input and output: standards and techniques - Quality of service and usability in sound

REFERENCE:

- A.K.JAIN, “ Fundamental of Digital Image Processing” PHI
- C.GONZALEX & R.E WOODS “ Digital Image Processing “ Addison Wesley
- Macromedia Flash MX 2004: The Complete Reference, Second Edition (Complete Reference)(for FLASH)
- Multimedia magic by S Gokul
- S. McGloughlin. Multimedia: Concepts and Practice. Prentice-Hall, 2001.
- N. Chapman & J. Chapman. Digital Multimedia. Wiley, Second Edition, 2004; and Digital Media Tools, 2nd or 3rd Editions, Wiley.

MPCS-06 ELECTIVE II

(A) ADVANCED NETWORKING AND SECURITY

Rationale (Course Objective):

- To introduce the Network Tools and Techniques using Socket programming.
- To discuss the possible network configurations and control strategies necessary for various applications and Cryptography using different methods.

Learning Outcomes:

By the end of the module, students should be able to:

- Install, configure and administer a server-based network.
- Understand the registry and event log and Understand common network services.
- Create and implement Group Policies and Install and configure print services.
- Understand file and directory permissions. Demonstrate the ability to solve common network problems.

Instructional Strategies:

To fulfill the aim of the subject, theory as well as practical sessions will be conducted. Apart from these regular seminars will also be conducted.

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
2	MPCS-05	Elective-II	1	2	100	50

Course Content:

1 Network Tools and Techniques

- Protocol layering, system design, multiple access, switching, scheduling, naming, addressing, routing, error control; flow control
- Traffic management – data link layer protocols
- Internet: concept, history, network layer, transport protocol UDP, TCP, Ipv4, Ipv6

2 Local Area Networks, Socket and Interprocess communication

- Topologies, access techniques, LAN, 802.11G wireless LANs.
- Application layer: DNS, Email, WWW, multimedia.
- TCP sockets, UDP sockets name and address conversion, IPv4 / Ipv6 interoperability - Socket programming.
- Posix IPC, system V IPC, Pipes, FIFO, Posix message queue,

- System V semaphore, RPC in Sun systems. Unix programming using IPe.

3 Classical Encryption, Block Cipher and the Data Encryption Standard

- Classical Encryption Techniques : Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Rotor Machines, Steganography.
- Simplified DES, Block Cipher Principles, The Data Encryption Standard
- Block Cipher Design Principles and Modes of Operation
- Advanced Encryption Standard : Evaluation Criteria , The AES Cipher

4 Contemporary Symmetric Ciphers and Confidentiality using Symmetric Encryption

- Triple DES, Blowfish, RC5,
- Characteristics of Advanced Symmetric Block Ciphers RC4 Stream Cipher.
- Placement of Encryption function, Traffic Confidentiality, Key Distribution, Random Number generation.

5 Introduction to Number Theory and Key Management

- Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality,
- The Chinese Remainder Theorem, Discrete Logarithms.
- Key Management, Diffie-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.
- Authentication applications – Electronic Mail Security, IP Security– Web Security – System Security : Intruders – Malicious Software - Firewalls

REFERENCE:

- Computer Networks, A.S. Tanenbaum, PHI, 4th ed, ISBN 81-7808-785-5
- Cryptography and Network Security Third Edition William Stallings
- Cryptography and Data Security Demming, D, Addison Wesley, 1982.
- Computer Networking A top down approach featuring the Internet, J.F.Kurose, K.W Rose, Pearson, ISBN 81-7808-247-0.
- An Engineering Approach to Computer Networks, S.Keshav, Addison Wesley, ISBN 981-235-986-9.
- Local Area Networks, G.E. Keiser, McGraw Hill, ISBN 0-07-033561-3.
- UNIX network programming, Vol I (Networking APIs: Sockets and XTI), W.Richard Stevens, PHI, ISBN 81-203-2061-1.
- UNIX network Programming, Vol II, (Interprocess Communication) Richards Slenens, PHI, ISBN 81-203-2062-X.

(B) BIOMETRICS AUTHENTICATION SYSTEMS AND EMBEDDED SYSTEMS

Rationale (Course Objective) :

The main focus of this subject is to explore the major theories of pattern recognition and image information processing (PRIP) and to discuss how these techniques and models are applied to Biometric Systems and other related applications. The goal of this course is to introduce the student to the design and implementation of an embedded system. The course covers the unique requirements and limitations of operating in an embedded environment. The course also covers microcontrollers as the most wide-spread example of embedded systems. In particular, the course covers the Intel 8051 family of microcontrollers, their programming and their interfacing.

Learning Outcomes:

- to understand and to apply a design methodology for dedicated computer-based systems
- to appreciate the considerations of design - specification, technological choice, the development process, economic and manufacturing constraints, reliability, safety, environment, maintenance, extensibility and also the importance of electromagnetic compatibility

Instructional Strategies:

To fulfill the aim of the subject, theory as well as practical sessions will be conducted. Apart from these regular seminars will also be conducted.

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
2	MPCS-05	Elective-II	1	2	100	50

Course Content:

1 Biometrics Authentication, Biometrics Sensors

- Traditional methods for personal authentication.
- Software and hardware biometrics systems.
- Image processing and pattern recognition in living body,
- Biometric data acquisition and database.
- The related biometrics preprocessing technologies, including: image restoration, image segmentation, pattern extraction and classification.

2 Biometrics Feature , Design and Implementation of Systems

- Extraction , Matching and Decision Making

- Various matching methods, including PCA and LDA.
- Introduce decision theory and their examples.
- Basic approaches of automated biometrics identification and verification systems.
- Various performance comparison and their analysis for large population authentication, accuracy and reliability of authentication in an *e*-world.
- Biometric Authentication Applications

3 Introduction to Embedded System

- Embedded systems description, definition, design considerations & requirements, embedded processor selection & tradeoffs.
- Embedded design life cycle.
- Embedded Microcontrollers Microcontroller features in more detail, Criteria for choosing a microcontroller ,
- The Rabbit 3000, architecture and features , Other manufacturers of embedded microcontrollers .

4 Introduction to the 8051 hardware

- 8051 instruction set and addressing modes ,
- 8051 Special function registers, I/O Ports,
- 8051 Timers/Counters , 8051 Serial port interface, RS-232 communication standard, 8051 Interrupts,8051 Parallel port interface

5 Switches and relays ,

- Switch de-bouncing ,Interfacing 8051 to a keyboard/LCD ,
- Analog to Digital Conversion (ADC) and Digital to Analog Conversion (DAC)
- Interfacing 8051 to a stepper motor and external memory

REFERENCE:

- Zhang, D (ed.), 2002, Biometrics Solutions for Authentication in an e-World, Kluwer Academic Publishers, USA.
- Jain, et al., (eds), 1999, Biometrics: Personal Identification in Networked Society, Kluwer Publisher.
- The 8051 Microcontroller, I. Scott McKenzie, 3rd. Edition, Prentice-Hall.
- The 8051 Microcontroller: Architecture, Programming, and Applications K. J. Ayala, West Publishing, 1991
- The 8051 Microcontroller: Hardware, Software and Interfacing, J. W. Stewart and K. X. Miao, 2nd. Edition, Prentice-Hall, 1999.
- Sid-Ahmed, M.A., 1995, *Image Processing, Theory, Algorithms, & Architectures*, McGraw-Hill.
- Awcock. G.W., et al., 1996, *Applied Image Processing*, McGraw-Hill.

(C) INTERDISCIPLINARY SCIENCE AND TECHNOLOGY –

Rationale (Course Objective) :

- The course addresses algorithms for automated computer vision. It focuses on building mathematical models of images and objects and using these to perform inference. The course offers a theory perspective in areas related to the structure, stability and functional characteristics of nanoscale materials and connection of this theory to physically based models and multiple scales. The course objective is to provide a detailed discussion of fuzzy set theory and fuzzy logic along with their applications to the areas of information systems, computational intelligence, and engineering.

Learning outcomes:

Student will able to

- How imprecision in concepts can be discussed using the basics of fuzzy sets
- The basic principles of organizing a fuzzy logic system
- Understand of common machine vision algorithms.
- Understand of the statistical design of algorithms.

Instructional Strategies:

To fulfill the aim of the subject, theory as well as practical sessions will be conducted. Apart from these regular seminars will also be conducted.

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
2	MPCS-05	Elective-II	1	2	100	50

Course Content:

1. ARTIFICIAL LINEAR

- Problems and Problem Spaces - Defining the Problem as State Space Search, Problem Characteristics, Heuristic Search Techniques
- Generate and Test, Hill Climbing, Best-First Search, Problem Reduction; Knowledge Representation - Representation and Mappings,
- Representing Simple Facts in Predicate Logic, Isa Relationship,
- Logic Programming; Natural Language Processing and Game Playing

2. FUZZY SYSTEM

- Basic concepts of fuzzy logic, Fuzzy Set Theory, Fuzzy relations, Fuzzy graphs and fuzzy arithmetic
- Fuzzy if-then rules, Fuzzy implications and approximate reasoning,
- Fuzzy inference systems, Fuzzy models, Fuzzy logic in control engineering, Fuzzy logic in database management and Information systems,

- Application of Fuzzy in pattern recognition and system identification, Fuzzy experts systems, Adaptive neuro-fuzzy systems, Genetic algorithm and fuzzy logic.

3. Machine Vision

- Concept of a machine vision system, Image file formats,
- Essentials of projective geometry, Image and camera models,
- Feature extraction, Camera calibration, Stereopsis, Structure from motion, Shape from single image cues, Object recognition,
- Pose Estimation, 3 D vision, Video images, Case studies.

4. Machine Learning

- Introduction, Concept learning and general-to-specific ordering, Decision tree learning, Supervised learning,
- Artificial neural networks, Evaluating hypotheses, Bayesian learning, Instance-based learning, Statistical learning methods, Memory based learning, Transformation based learning, Inductive logic programming,
- Support vector machine, Unsupervised learning, Temporal difference learning, Reinforcement learning, Explanation based learning.

5. Nano Science

- Overview of Nanoscience
- Material Science and Tribology

REFERENCES:

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- Ross T. J., Fuzzy Logic with Engineering Applications, 2nd ed, John Wiley & Sons, 2004.
- Pal S.K., and Mitra, S., Neuro-fuzzy Pattern Recognition: Methods in Soft Computing, Wiley, 1999.
- Forsyth D. A. and Ponce J., Computer Vision: A Modern Approach, Prentice Hall, 2002.
- Trucco and Verri A., Introductory Techniques for 3-D Computer Vision, Prentice Hall, 1998.
- Gonzolez R. C., and Woods R. E., Digital Image Processing, 2nd ed., Addison Wesley, 2002.
- Mitchell T. M., Machine Learning, McGraw-Hill, 1997.
- Alpaydin E., Introduction to Machine Learning, MIT Press and Prentice Hall of India, 2004.
- Nelson N. J., Introduction to Machine Learning, (Online book draft) <http://robotics.stanford.edu/people/nilsson/mlbook.html>, 2005.
- Langley P., Elements of Machine Learning, Morgan Kaufmann, 1996.
- Goddard, et al., Handbook of Nanoscience Engineering and Technology, CRC Press, Boca Raton, 2002.
- Electronic or paper subscription to at least one of journal in nanotechnology

(D) NEXT GENERATION HETEROGENEOUS NETWORKS

Course Objectives:

This course covers signaling in wire-line networks, intelligent network standards and issues related to the converging telecommunication networks. This course covers concepts of network administrator, management, network performance measurements and security issues involved in widely deployed network.

Learning Outcomes:

Having successfully completed this course, the students will:

- demonstrate advanced knowledge of networking and wireless networking in particular
- compare different solutions for communications at each network layer
- demonstrate knowledge of protocols used in wireless communications
- Analyze voice packetization parameters that can be modified to meet the customer's voice quality objectives
- Determine optimal VoIP traffic flow recommendations and QoS requirements
- Identify the existence of data network issues known to be problematic for VoIP traffic

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
2	MPCS-05	Elective-II	1	2	100	50

Course Content:

1. Next Generation Networks

- SS7 protocols and its component
- Signaling units and associate protocols such as MTPs, ISUP,SCCP,INAP,MAP
- Intelligent networks, IN conceptual model
- Capability sets, creation of services, AIN, SS7 over IP
- Soft switching , other IN architecture such as TINA , Parley.

2. Network Management

- Network Tools and Techniques
- Study of protocol
- Concept of Traffic sharing
- Congestion Management

3. Network Security

- Security threats and attacks

- Security and firewall technologies
- Proxy Service
- Cryptography, hashing, DSE3, tunneling protocol
- TCP/IP stack fingerprint techniques
- Introduction to IPSEC
- Public Key encryption

4. Wireless Network

- Different wireless standard
- Standard 802.11 – frame types and formats, different physical layer transmission techniques
- Channel access and allocation, media access techniques
- Normalization contention based and contention free access
- Mobility and handoff ,mobile IP and Quality of Service
- Performance measurement ,WLAN security issue

5. Mobile Network

- Multiple access techniques
- Spread Spectrum techniques
- Cellular mobile phone architecture
- Frequency assignment and channel reusability
- Access algorithms to the shared control channel ,mobility and handover
- Introduction to VoIP
- VoIP switch Asterisk ,Analysis of SIP signaling
- VoIP gateway configuration , Analysis of H.323 signaling –Gatekeeper
- VoIP telephony quality, QoS

REFERENCES:

- Computer Networks, A.S. Tanenbaum, PHI, 4th ed, ISBN 81-7808-785-5
- Computer Networking A top down approach featuring the Internet, J.F.Kurose, K.W Rose, Pearson, ISBN 81-7808-247-0.
- An Engineering Approach to Computer Networks, S.Keshav, Addison Wesley, ISBN 981-235-986-9.
- HERSENT, O. - PETIT, J. P. - GURLE, D.: Beyond VoIP Protocols: Understanding Voice Technology and Networking Techniques for IP Telephony John Wiley & Son Ltd, 2005.
- RAAKE, A.: Speech Quality of VoIP:Assessment and Prediction John Wiley & Son Ltd, 2006.
- Mobile Computing , Dr. N.N.Jani ,Dr. Ashish N. Jani, Neeta Kanabar, Kamaljit Lakhtaria

MPCS-04 PROJECT WORK

Rationale (Course Objective) :

The objective of the project is to help the student develop the ability to apply theoretical and practical tools / techniques to solve real life problems related to industry, academic institutions and research laboratories.

Learning Outcome:

After the completion of this project work, the student should be able to:

- Describe the Systems Development Life Cycle (SDLC).
- Evaluate systems requirements.
- Complete a problem definition.
- Evaluate a problem definition.
- Determine how to collect information to determine requirements.
- Perform and evaluate feasibility studies like cost-benefit analysis, technical feasibility, time feasibility and Operational feasibility for the project.
- Work on data collection methods for fact finding.
- Construct and evaluate data flow diagrams.
- Construct and evaluate data dictionaries.
- Evaluate methods of process description to include structured English, decision tables and decision trees.
- Evaluate alternative tools for the analysis process.
- Create and evaluate such alternative graphical tools as systems flow charts and state transition diagrams.
- Decide the S/W requirement specifications and H/W requirement specifications.
- Plan the systems design phase of the SDLC.
- Distinguish between logical and physical design requirements.
- Design and evaluate system outputs.
- Design and evaluate systems inputs.
- Design and evaluate validity checks for input data.
- Design and evaluate user interfaces for input.
- Design and evaluate file structures to include the use of indexes.
- Estimate storage requirements.
- Explain the various file update processes based on the standard file organizations.
- Decide various data structures.
- Construct and evaluate entity-relationship (ER) diagrams for RDBMS related projects.
- Perform normalization for the normalized tables for RDBMS related projects
- Decide the various processing systems to include distributed, client/server, online and others.
- Perform project cost estimates using various techniques.
- Schedule projects using both GANTT and PERT charts.
- Perform coding for the project.
- Documentation requirements and prepare and evaluate systems documentation.
- Perform various systems testing techniques/strategies to include the phases of testing.
- Systems implementation and its key problems.

- Generate various reports.
- Be able to prepare and evaluate a final report.
- Brief the maintenance procedures and the role of configuration management in operations.
- To decide the future scope and further enhancement of the system.
- Plan for several appendices to be placed in support with the project report documentation.
- Work effectively as an individual or as a team member to produce correct, efficient, well-organized and documented programs in a reasonable time .
- Recognize problems that are amenable to computer solutions, and knowledge of the tools necessary for solving such problems.
- Develop of the ability to assess the implications of work performed.
- Get good exposure and command in one or more application areas and on the software
- Develop quality software using the software engineering principles

Instructional Strategies:

Practical sessions allotted for project would ensure that the students undergo sincere work under the guidance of faculty members.

Sr.	SUBJECT CODE	NAME OF THE SUBJECT	Teaching Scheme		Examination Scheme	
			Theory	Practical	Theory	Practical/Viva
1	MPCS-06	Project Work	-	4	-	400