

Department of Computer Science  
**University of Kerala**

Scheme and Syllabus  
**M.Sc Computer Science**  
(w.e.f 2013 admission)

**July 2013**

## Scheme

### **I Semester**

Course No	Subject	Credit	Total Credit
COS511	Discrete Structures	3	21
COS512	Computer System Architecture	4	
COS513	Data Structures using C++	3	
COS514	Design and Analysis of Algorithms	3	
COS5---	Elective I		
COS516	Lab-I (Data Structures using C++)	4	
COS517	Case Study-I(Based on COS513 and COS514)	1	

### **II Semester**

Course No	Subject	Credit	Total Credit
COS521	Operating Systems	3	21#
COS522	Advanced Java Programming	3	
COS523	System Software and Compiler Design	3	
COS524	Computer Networks	3	
COS5---	Elective II		
COS525	Seminar	1	
COS526	Lab-II (Java Programming)	4	
COS527	Case Study-II (Based on COS522 and COS24)	1	
#	Extra Departmental Elective		

### **III Semester**

Course No	Subject	Credit	Total Credit
COS531	Software Engineering	3	20
COS532	Advanced Database Management Systems	3	
COS533	Internetworking and Web Programming	3	
COS5---	Elective III		
COS5---	Elective IV		
COS534	Lab-III (Web Programming and DBMS)	4	
COS535	Case Study-III (Object Oriented Analysis and Design, Database and Web Programming)	1	

### **IV Semester**

Course No	Subject	Credit	Total Credit
COS541	Project & Viva-Voce	12	12

## Electives

<b>I Semester</b>		
<b>Course No</b>	<b>Subject</b>	<b>Credit</b>
COS501	Computer Graphics and Image Processing	3
COS502	Knowledge Based Systems	3
COS503	Software Agents	3
COS504	Pattern Recognition	3
COS505	Data Mining	3
<b>II Semester</b>		
COS506	Micro Processors and Microcontroller	3
COS507	Wireless Communications and Networks	3
COS508	Parallel Processing	3
COS509	Neural Network and Fuzzy Systems	3
COS510	Embedded Systems	3
<b>III Semester</b>		
COS511	Cryptography and Network Security	3
COS512	Cloud Computing	3
COS513	Software Project Management	3
COS514	Network Administration and Management	3
COS515	Cyber Security and Cyber Law	3
Note: The elective papers shown in the above list can be offered as per the decision of the Department Council.		

- Eligibility** : Candidates shall be required to possess First class Bachelor's Degree with not less than 60% marks in Computer Science/ Computer Applications/ Electronics/ Any other degree in Science with Computer Science or Computer Applications as major components or an equivalent degree recognized by the University of Kerala.
- Admission** : As per C.S.S regulations
- Duration** : 4 semesters: 3 semesters of taught courses and one semester of project work.
- Examinations and Evaluation** : As per C.S.S regulations

## Detailed Syllabus

### I Semester

#### COS511 DISCRETE STRUCTURES

##### Module I

Mathematical Logic-Propositional (Boolean) Logic, Predicate Logic, Well-Formed Formulae (WFF), Satisfiability and Tautology, Review of Set Theory, Relations, Functions, Elementary Counting Techniques, Inclusion-Exclusion Principle, Pigeonhole Principle, Equivalence and Partial Orderings

##### Module II

Graphs-Basic Terminology, Weighted Graphs, Walk, Path and Circuit, Hamiltonian Paths and Circuits, Planar Graphs and Euler's formula, Trees, Rooted trees, Prefix codes, Binary Search Trees, Spanning Trees, Eccentricity of a vertex radius and diameter of a graph.

##### Module III

Introduction to formal languages: Concepts of automata theory, Finite automata: Deterministic finite automata, Non- Deterministic finite automata, Conversion: Regular Expression to NFA and NFA to DFA, PDA, DPDA, CFG, Turing Machine and Chomsky hierarchy of languages.

##### Text books:

- Tremblay, J P; Manohar, R, Discrete mathematical structures with applications to Computer Science. - TMH, 2008(Reprint).
- Liu, C L, Elements of Discrete Mathematics. 2 ed.-MCH, 1986.
- John.E.Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia, 2002.

##### Reference:

- Johnsonbaugh, Discrete Mathematics, 6/E, Pearson Education India, 2007
- Grassmann, Logic And Discrete Mathematics: A Computer Science Perspective, Pearson Education India, 2007
- McElice, Robert J; Ash, Robert B; Ash, Carol, Introduction to discrete Mathematics. - MCH, 1989.

#### COS512 COMPUTER SYSTEM ARCHITECTURE

##### Module I

Introduction to digital design- Data Representation - Data Types - Complements - Arithmetic Operations - Representations - Fixed Point, Floating Point, Decimal Fixed Point - other Binary Codes- Logic Gates, Boolean Algebra, Map Simplification - Combinational Circuits: Half- Adder, Full Adder- Flip Flops - Sequential Circuits. ICs -

Decoders - Multiplexers - Registers - Shift Registers - Binary Counters - Memory Unit - Register Transfer Language - Register Transfer - Bus And Memory Transfers - Arithmetic , Logic And Shift Micro Operations , Arithmetic Logic Shift Unit.

### **Module II**

Introduction, Computer Evolution and Performance, System Buses : Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, PCI. Internal Memory : Computer Memory system, Semi Conductor Main Memory, Cache Memory, Advanced DRAM Organization. External Memory : Magnetic Disk, Optical Memory, Magnetic Tapes. Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupted -Driven I/O, DMA, I/O Channels and Processors, External Interface.

### **Module III**

Computer Arithmetic: ALU, Integer Representation, Integer Arithmetic, Floating - Point Representation, Floating - Point Arithmetic Representation. Instruction Sets: Characteristics and Functions: Machine Instruction Characteristics, Types of Operands, Types of Operations, Assembly Language, Instruction Sets: Addressing modes and Formats: Addressing, Instruction Formats. CPU Structure and Function: Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining.

### **Module IV**

Reduced Instruction Sets Computers: Instruction Execution Characteristics, Reduced Instruction Set Architecture, RISC Pipelining, The RISC versus CISC Controversy. Control Unit Operations: Micro Operations, Control of the Processor, Hardwired Implementation, Micro programmed Control: Microinstruction sequencing, Microinstruction Execution.

### **Text books:**

- Computer System Architecture By M. Morris Mano ( Unit I)
- Computer Organization & Architecture By William Stallings. Pearson Education (Unit II,III & IV).

### **Reference:**

- V.C.Hamatcher,et al “Computer Organization”, Tata Mcgraw Hill.

## **COS513 DATA STRUCTURES USING C++**

### **Module I**

Introduction to Object Oriented programming: Syntax and semantics of C++, Object Oriented programming in C++. Implementation of Object Oriented programming Concepts in C++ - classes, objects, constructors, destructors; Static and dynamic binding. Inheritance- types of inheritance, message ambiguity problem; virtual functions and abstract classes, friend functions, templates, exception handling.

### **Module II**

Introduction to Data Structures. Linear and Nonlinear Data Structures, Arrays - indexing and address calculation of multidimensional arrays, Linked lists - implementation and different operations on singly linked lists and doubly linked lists. Stack-array and linked list

implementation, infix and post fix notations using stack, Queue- array and linked list implementations, Circular Queue, double ended Queue, Priority Queue.

### **Module III**

Nonlinear Data Structures-Concepts and terminologies of Trees, binary tree- implementation and traversals; AVL trees-importance, left and right rotations of tree; Graphs - representations and traversals, Spanning Tree-Minimum spanning tree algorithms. Hashing, B trees and B+ trees. Insertion Sort and Binary Search Trees, Mergesort, Quicksort, Balanced Search Trees. Red-Black Trees.

#### **Text books:**

- Y.Langsam, M.j. Augenstein and A.M.Tanenbaum, Data Structures Using C and C++, Pearson Education, 2007
- Ananda Rao Akepogu, Radhika Raju Palagiri, Data Structures and Algorithms Using C++, Pearson Education, 2011
- Lippman, stanley, B, C++ primer .3 ed.-Pearson Education, 2000

#### **Reference:**

- Hubbard John R, Schaum's Outline of data structures with C++, Tata McGraw Hill, 2007
- Horwitz E, Sahni, Sartaj and Mehta D, Fundamentals of Data structures in C++, Galgotia Publications, 2009.
- Weiss MA, Data Structures and Algorithms Analysis in C++, Pearson Education, 2007

## **COS514 DESIGN AND ANALYSIS OF ALGORITHMS**

### **Module I**

The Role of Algorithms in Computing, Algorithm Specifications, Analyzing Algorithms, Designing algorithms. Asymptotic notation, Recurrences, Performance analysis-Space Complexity, Time Complexity, Amortized Complexity. Divide and Conquer- General method, Binary Search, Finding the Maximum and Minimum, Quick Sort.

### **Module II**

Greedy Methods- Elements of Greedy strategy, Knapsack Problem, Minimum-Cost Spanning Trees-Prim's Algorithm, Kruskal's Algorithm. Dynamic Programming-Multistage Graphs, Single-Source Shortest Paths, All-Pairs Shortest Paths.

### **Module III**

Basic Traversal and Search Techniques-Breadth First Search and Traversal, Depth First Search and Traversal. Backtracking-8 Queens Problem, Sum of Subsets.Branch and Bound-Traveling Salesperson Problem, String Matching, NP Hard and NP-Complete Problems.

#### **Text books:**

- Thomas H Corman, Charles E Leiserson,Ronald L Rivest,Clifford Stein Introduction to Algorithms Second Edition PHI, 2008
- Ellis Horowitz,Sartaj Sahni,Sanguthevar Rajasekaran Fundamentals of Computer

Algorithms Second Edition University Press Pvt Ltd, 2007

- Sedgewick, Algorithms in C++, 3/e, Pearson Education India, 2009

**Reference:**

- Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 2003.
- Sara Baase and Allen Van Gelder, Computer Algorithms - Introduction to Design and Analysis, Pearson Education Asia, 2003.
- A.V.Aho, J.E. Hopcroft and J.D.Ullman, The Design and Analysis Of Computer Algorithms, Pearson Education Asia, 2003

### **COS516 Lab-I (Data Structures using C++)**

Hands on experiments on the following topics using any C++ compiler/ide

Programs to revise the basic syntax and semantics of C++

Implementation of basic Object Oriented programming Concepts - Class, Objects, Messaging, Polymorphism and data hiding

Programs to explain the working of different types of constructors and destructor

Programs to explain the object Oriented programming Concepts - Inheritance, abstract classes, friend function, templates

Implementation of data structures - Linked lists, stack and queue, Binary Tree, Tree Traversals, representation of graph.

## **II Semester**

### **COS521 OPERATING SYSTEMS**

#### **Module I**

Introduction, Mainframe Systems, Desktop Systems, Multiprocessor Systems Distributed Systems, Clustered Systems, Real-Time Systems, Handheld Systems. Computer - System Structure: Computer-System Operation, I/O Structure, Storage Hierarchy, Hardware Protection, Network Structure. Operating - System Structures: System Components, Operating System Services, System Calls, System Programs, System Structure and Virtual Machines.

#### **Module II**

Process Management: Processes: Process Concept, Process Scheduling, Operating on Processes, Cooperating process, Inter-process Communication. Threads: Multithreading Models, Multithreading Issues, Pthreads., CPU Scheduling: Scheduling Criteria and Scheduling Algorithms, Multiple-Processor Scheduling, Real Time Scheduling and Algorithms Evaluation. Process Synchronization: Critical Section Problem, Semaphores & Monitors. Deadlock: Deadlock-Characterization, Methods of Handling the Deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery. Storage Management: Memory Management: Swapping, Contiguous Allocation, Paging, Segmentation and Segmentation

with Paging. Virtual Memory: Demand Paging, Page Replacement, Allocation of frames, Thrashing.

### **Module III**

File System Interface: Access Methods, Directory Structure, File Sharing, Protection. File System Implementation: File System Structure, Allocation Methods, Free-Space Management. I/O Systems: I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O to Hardware Operations. Mass-Storage Structure: Disks Structure, Disk scheduling and Management, Swap-Space Management.

#### **Text books:**

- Siberschartz A and Galvin P, Operating system Concepts, 6thEd Addison Wesley

#### **Reference:**

- William Stallings, Operating Systems, 5ed, Pearson Education, 2007
- Andrew S Tanenbaum, Modern Operating System, 2ed, Pearson Prentice Hall, 2008

## **COS522 ADVANCED JAVA PROGRAMMING**

### **Module I**

Introduction to programming in java - Syntax and semantics of Java. Characteristics of java - a comparative study between java & C++. Interfaces, Packages, Exception handling, Multithreading, AWT and applets, data base programming in Java

### **Module II**

Computer Network and Internet Addressing. Introduction to inter-process communication & Sockets, Java and Network programming: Sockets - Client & Server sockets, UDP Datagrams. URLConnection. Remote Method Invocation.

### **Module III**

RMI-Define-implementing RMI-RMI interface-Define client and server-compile & execute client and server. EJB architecture - EJB requirements - Design and implementation - EJB session beans - EJB entity beans - EJB Clients - Deployment.

#### **Text books:**

- Herbert Schildt, Java 2: The Complete Reference, Fifth Edition: the complete reference, McGraw Hill Professional, 2002
- Joe Wigglesworth & Paula McMillan, "Java Programming: Advanced Topics", Third Edition, Thomson Learning Inc., 2007.
- Steven Holzner , Java2, swing, servlets, JDBC & JAVA Beans Programming Black Book Dreamtech press, 2010

#### **Reference:**

- Eckel, Thinking In Java, 4/E, Pearson Education India, 2006
- Calvin Austin and Monica Pawlan, "Advanced Programming for the Java 2 Platform", 2000.
- Harvey M. Deitel, Paul J. Deitel, Sean E. Santry, Advanced Java 2 Platform: How to Program- How To Program Series. Prentice Hall PTR, 2002

## COS523 SYSTEM SOFTWARE AND COMPILER DESIGN

### Module I

Introduction to System Software, Assemblers- Basic Assembler Function, Assembler Design Options- One pass and Multi pass Assemblers. Loading-Basic Loader Functions, Simple Bootstrap Loader, Machine Dependent Loader Features: Relocation, Linking, Linking Loader, Loader Design Option: Linkage editors, Dynamic Linking.

### Module II

Finite Automata, determinism and NFA , Minimizing the number of states to DFA. Push Down Automata (PDA), Determinism and Nondeterminism and languages accepted by these structures. Grammars -Types of grammars-type 0, type 1, type 2, type 3. The relationship between types of grammars. Compilers- Compiler structure, Phases of compiler, Lexical analysis: Specification and recognition of tokens, regular expressions and regular languages.

### Module III

Syntax Analysis:- Role of Parser and parse trees. Representation of parse (derivation) trees as rightmost and leftmost derivations. Top-down parsers-Recursive descent parser. Bottom up parsers-shift reduce parsing, operator precedence parsing, Semantic Analysis:-Static and Dynamic Type checking, Syntax Directed Translation: Types Of Syntax Directed Definition. Intermediate Codes-Quadruples, triples. Intermediate code generation: Three Address Codes Generation, Code Optimization-Principal Sources Of Optimization, Code generation-Concepts and definitions, Directed acyclic graph representation.

### Text books:

- Beck, Leland L, System Software: An introduction to system programming, 3ed ADDISON WESLEY Publishing Company Incorporated, 1997
- Aho, Alfred V; Ullman, Jeffrey D.,Principles of compiler design.2 ed. - Narosa, 1985.
- Alfred V. Aho, Compilers: principles, techniques, & tools, Pearson/Addison Wesley, 2007

### Reference:

- John E. Hopcroft, Introduction To Automata Theory, Languages, And Computation, 3/E, Pearson Education India, 2008
- Steven S. Muchnick, Advanced Compiler Design Implementation, Morgan Kaufmann, 1997
- Nasir S.F.B,P.K Srimani, Automata Theory
- D.M. Dhamdhere, System Programming and Operating System,Tata Mcgraw Hill.

## COS524 COMPUTER NETWORKS

### Module I

Internet- Network Edge, Network Core, Delay, Loss and Throughput in packet Switching Networks, Protocol Layers and Their Service Models. Application Layer-Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet, DNS-The Internet Directory Service, Peer-to-Peer Applications. Transport Layer-Services, Multiplexing

and Demultiplexing, Connectionless Transport UDP, Principles of Reliable Data Transfer, Connection Oriented Transport:TCP, Principles of Congestion Control.

### **Module II**

Network Layer- Virtual Circuit and Datagram Networks, Internet Protocol-IPV4 Addressing, IPV6, Working of a Router, Routing Algorithms-Distance Vector Routing. Routing in the Internet-Intra and Inter Autonomous Routing. Link Layer-Services, Error Detection and Correction Techniques- Checksumming Methods, Cyclic Redundancy Check(CRC),Link Layer Addressing-MAC Addresses, Address Resolution Protocol(ARP),Ethernet-CSMA/CD, Link Layer Switches, Point to Point Protocols(PPP).

### **Module III**

Wireless and Mobile Networks - WiFi 802.11 Wireless LANs, Cellular Internet access, Mobility Management Principles, Mobile IP, Managing Mobility in Cellular Networks, Wireless and Mobility. Multimedia Networking-Multimedia Network Applications, Security in Computer Networks-Network Security-Definition, Principles of Cryptography, Securing Wireless LANs.

### **Text books:**

- Kurose,James F ; Ross,Keith W , Computer networking: a top-down approach featuring the internet. - Addison-Wesley, 2001.

### **Reference:**

- Comer, Computer Networks and Internets with Internet Applications 5/e , Prentice Hall, 2009
- Andrew S. Tanenbaum, Computer Networks, 4/E, Prentice Hall PTR, 2003
- William Stallings, Data and Computer Communications, 8/e, Pearson Education India, 2007

## **COS525 LAB-II (Java Programming)**

Hands on experiments in java using netBeans or any other IDE

Programs to expertise the use of java API

Programs to differentiate the features of java in comparison with C++

Programs to a familiarize the use of Interfaces, Packages

Programs to explain the use of user defined Exception handling

Programs to explain the importance of Multithreading in java

User interfacing with java

Programs to explain the data base programming in Java

Programs to explain the facilities available in java to handle inter-process communication

Programs to implement distributed computing using Remote Method Invocation.

Programs using EJB

## **III Semester**

## **COS531 SOFTWARE ENGINEERING**

### **Module I**

Evolving role of software, Software Characteristics, Software Engineering Challenges (Scale,

Quality Productivity, Consistency and Repeatability, Change), Software standard, Software Process Models: Waterfall Model, Prototyping Model, Spiral Model, Incremental Model, Concurrent Development Model. Software Process and Project Metrics: Measures, Metrics and Indicators, Software measurement: Size and Function Oriented Metrics. Capability Maturity Model Integration (CMMI), Process Planning, Estimation, COCOMO Model, Risk Analysis & Management: Software risks, Risk identification, Risk monitoring and management.

### **Module II**

Software requirements: need for SRS, requirement process; Requirement specification (characteristics, components), Concept of Use Cases, Concept of Requirement Validation. Design: Function oriented design, Design principles, Coupling and Cohesion, Design Notations & Specifications, Structured Design Methodology; Object-Oriented Design, OO Concepts, Design Concepts, Design Methodology, Dynamic & Functional Modeling, Design Verification.

### **Module III**

Software Quality Concepts: Quality, Quality control, Cost of quality; Software Quality Assurance (SQA), Formal approaches to SQA, Software Reliability: Measures of Reliability, Software safety, Quality Standards. Software Testing: Testing fundamentals, Black-Box Testing, White Box Testing, Regression Testing, Smoke Testing, Alpha Testing, Beta Testing, Recovery Testing, Security Testing, Stress testing, Performance testing.

### **Text books:**

- Roger S Pressman, Software Engineering – A Practitioner’s Approach, McGraw-Hill Higher Education, 2010.
- Sommerville I, Software Engineering, Addison-Wesley, 2007.

### **Reference:**

- Pfleeger, Software Engineering, Pearson Education India, New Delhi, 1999.
- Carlo Ghezzi, Mehdi Jazayari and Dino Mandrioli, “Fundamentals of Software Engineering”, Prentice Hall of India, New Delhi, 1991.
- James F. Peters, Software Engineering , An Engineering Approach, Wiley& Sons, 2007

## **COS532 ADVANCED DATABASE MANAGEMENT SYSTEMS**

### **Module I**

Introduction to Databases, Database Environment- Three Level ANSI SPARC Architecture, The Relational Model and Languages- terminology of Relational Model, Integrity Constraints, Relational Algebra and Relational Calculus, Database Design-Entity Relationship diagrams, Normalization theory- 1NF,2NF,3NF,BCNF, Multi valued dependencies and Fourth normal form – Join dependencies and Fifth normal form. Limitation of 4NF and BCNF.

### **Module II**

SQL-Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL) commands, Database objects like – Views, indexes, sequences, synonyms and data dictionary. Transaction Processing Concepts, Desirable Properties of a Transaction,

Schedules and Recoverability, Recovery Techniques, Database Backup, Locking techniques for Concurrency Control

### **Module III**

Object Oriented Database Management Systems: Concepts, Composite objects, Issues in OODBMSs, Advantages and Disadvantages of OODBMSs. Distributed Databases-concepts, Advantages and Disadvantages of DDBMS, homogeneous and Heterogeneous DDBMS, Function of DDBMS

#### **Text books:**

- Connolly, Thomas M; Begg, Carolyn E, Database systems: a practical approach to Design, Implementation, and Management.5 ed., Pearson Education, 2003.
- C.J. Date, Introduction to Database Systems, Pearson Education Asia, 2003.
- M. Tamer Ozsu, Patrick Valduriez, Principles of Distributed Database Systems, 3 ed, Springer, 2011.

#### **Reference:**

- Ramez Elmasri, Shamkant Navathe, Fundamentals of Database Systems, 6 ed, ADDISON WESLEY Publishing Company Incorporated, 2011
- Database System Concepts Fifth Edition. Avi Silberschatz · Henry F. Korth · S. Sudarshan. 6 ed, McGraw-Hill Education, 2010
- Atul Kahate, Introduction to Database Management Systems, Pearson Education, New Delhi, 2004

## **COS533 INTERNETWORKING AND WEB PROGRAMMING**

### **Module I**

Introduction to Client Server architecture, Working of Domain Name Servers, Web server – apache & IIS, Basic knowledge in HTML & XML Introduction to client side scripting languages – JavaScript & VB scripts, Introduction to server side scripting languages. Introduction to Search Engines and their working.

### **Module II**

Introduction to .Net Framework and Common Language Runtime, ASP.NET- introduction & features of ASP.NET, understanding ASP.NET controls, applications, web servers, Web forms, web form controls, server controls, client controls, Adding controls a runtime, creating a multiform web project, Form validation: client side and server side validation, Validation controls: required field comparison range, Overview of ADO.NET, from ADO to ADO.NET, ADO.NET architecture, Accessing data using data adapters and datasets, using command and data reader, binding data to data bind controls, displaying data in data grid.

### **Module III**

PHP - Adding PHP to HTML -Syntax and Variables - Control and Functions - Passing Information between Pages – Strings – Arrays and Array Functions – Numbers - MySQL Database Administration - PHP/MySQL Functions -Displaying Queries in Tables - Building Forms from Queries.

#### **Text books:**

- Deitel, Internet and World Wide Web, 4/e, Pearson Education India, 2009

- Stephen Walthe, Kevin Hoffman, Nate Dudek, ASP.NET 4 Unleashed, Pearson Education, 2011
- Robin Nixon, Learning PHP, MySQL, and JavaScript, O'Reilly Media, Inc., 2009

**Reference:**

- Nancy J. Yeager, Web Server Technology: The Advanced Guide for World Wide Web Information Providers (ISBN13: 9781558603769), Morgan Kaufmann, 1996
- Scott Millett, Professional ASP.NET Design Patterns, John Wiley & Sons, 2010
- Michele E. Davis, Jon A. Phillips, Learning PHP & MySQL: Step-by-Step Guide to Creating Database-Driven Web Sites, 2 ed, O'Reilly Media, Inc., 2009

**COS534 LAB-III**

Hands on experiments in java using Adobe Dreamweaver or any other IDE

Design of dynamic web pages using java script and vb scripts

Programs in ASP.NET to understand the various controls in .NET

Programs in ASP.NET that performs client side validations

Design of dynamic web pages using PHP.

Design of web pages with Database using ASP.NET and PHP in order to study the DDL and DML commands

**COS501 COMPUTER GRAPHICS AND IMAGE PROCESSING**

**Module I**

Overview of graphic systems, Display devices, Hard Copy Devices, Interactive Input Devices, Output primitives and it's construction algorithms-DDA(Digital Differential Analyzer Algorithm) line drawing algorithm, Bresenham' s line drawing algorithm, Bresenham's circle drawing algorithm. Two Dimensional Geometric Transformations, Window to View port Transformations, Clipping, 3-D Display Techniques, 3-D transformations, Hidden Surface Removal Methods- Depth Buffer Method,. A-Buffer Method, Scan-line Method, Depth Sorting Method and Area Subdivision Method.

**Module II**

Digital Image Fundamentals-Elements of Digital Image Processing Systems, color Image fundamentals, RGB, HIS Models, Image sampling, Quantization. Image Enhancement-Histogram equalization and specification techniques, Homomorphic filtering, Color image enhancement. Image Restoration - degradation model, Unconstrained restoration , Geometric transformations-spatial transformations.

**Module III**

Image Segmentation-Edge detection, Edge linking via Hough transform - Thresholding - Region based segmentation - Region growing - Region splitting and Merging - Segmentation by morphological watersheds - basic concepts - Dam construction - Watershed segmentation algorithm. Image Compression-Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

**Text books:**

- Hearn, Donald; Baker, Pauline, M., Computer graphics: C version .2 ed. - Pearson,

1995.

- Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing', Pearson, Second Edition, 2004.
- Anil K. Jain, Fundamentals of Digital Image Processing', Pearson 2002.

**Reference:**

- Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.
- Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.
- D,E. Dudgeon and RM. Mersereau, , Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.
- William K. Pratt, , Digital Image Processing' , John Wiley, New York, 2002
- Milan Sonka et al, 'IMAGE PROCESSING, ANALYSIS AND MACHINE VISION', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

## COS502 KNOWLEDGE BASED SYSTEMS

### Module I

Overview of AI, Rule Based Expert Systems, Knowledge Acquisition and Representation: Machine Intelligence, Knowledge Engineering, Procedure for Knowledge Acquisition, Knowledge Representation, Different Representation Schemes, Uncertainty and Fuzzy Logic.

### Module II

Reasoning and KRR Systems: Reasoning, Knowledge Representation and Reasoning (KRR) System, Knowledge Representation (KR) Languages, Domain Modeling, Semantic Nets (Associative Networks) Reasoning Systems, Frames Based Systems, Hybrid Representation Systems.

### Module III

Search Technologies: Problem Solving in AI, Blind Search Techniques, Heuristic Search Techniques Expert Systems: Introduction, Skill versus Knowledge, Basic Characteristics of an Expert System, Advanced intelligence system - Intelligence System over internet.

**Text books:**

- Nilsson, Nils J., Artificial intelligence, a new synthesis. - Harcourt(India), 2000
- Stuart Russel and Peter Norvig., Artificial Intelligence a Modern Approach, 2nd ed., Pearson Education 2002.
- Decision support Systems - Second Edition - George M Marakas -prentice Hall.

**Reference:**

- Decision Support Systems & Intelligent Systems - Seventh edition Efraim Turban & Jay E. Aronson Ting-Peng Liang - Pearson/prentice Hall
- Decision Support Systems - V.S. Janakiraman & K. Sarukesi
- Decision Support systems and Data warehouse Systems by Efram G Mallach- Mc Graw Hill

## COS503 SOFTWARE AGENTS

### Module I

Introduction to Agents. Reactive Machines-stimulus response agents, introduction to neural networks, state machines, robotic vision

### Module II

Search in state space: agents that plan, uniformed search, heuristics search, planning, acting, and learning, alternative search formulations and applications, adversarial search

### Module III

Planning methods based on logic: the stimulation calculus, planning; Communication and integration-multiple agents, communication among agents, agent architectures.

#### Text books:

- Nilsson, Nils J., Artificial intelligence, a new synthesis. - Harcourt(India), 2000
- Russel, Stuart J and Norvig, Peter., Artificial intelligence, a modern approach. - Pearson Asia, 1995
- Rich, Elaine; Knight, Kevin., Artificial Intelligence. - Tata McGraw-Hill, 1991.

#### Reference:

- Wooldridge MR, Intelligent Agents, in G.Weiss(Ed), Multiagent Systems, MIT Press, Cambridge.
- Jeffrey M. Bradshaw, Software Agents (Editor). MIT Press
- Luger., Artificial Intelligence. 4 ed.- Pearson Education.

## COS504 PATTERN RECOGNITION

### Module I

Introduction-Application of Pattern recognition, statistical decision theory, image processing and analysis. Probability: Introduction, probability of events, Random variables, Joint Distribution and Densities, Moments of Random variables, Estimation of Parameters from samples, minimum Risk estimation.

### Module II

Statistical Decision Making: introduction, Baye's Theorem Multiple Features. Conditional Independent Features, Decisions boundaries, Estimation of Error rates, characteristics centers, estimating the composition of populations.

### Module III

Non Parametric Decision making: Introduction, Histograms, Nearest neighbor Classification Techniques, Artificial Neural networks: Introduction, Nets without Hidden layers, Nets with Hidden layers, The back, propagation algorithm, hopfield nets.

#### Text books:

- Gose, Earl; Johnsonbaugh, Richard; Jost, Steve. Pattern recognition and image analysis. PHI, 1997

#### Reference:

- Fu.K.S, Syntactic Methods in Pattern Recognition,.- Academic Press,1994
- Duda, R O ; Hart, P E., Pattern Classification and Scene Analysis,-John Wiley,1973

## COS505 DATA MINING

### Module I

Introduction to Data mining; Data Warehouses; Data preprocessing -cleaning, integration and transformation, data reduction, data mining primitives, languages and system architecture.

### Module II

Introduction to probability-random variables; spatial random variables; supervised learning; Bayesian decision theory; dimensionality reduction; clustering; decision trees; multi layer perceptrons

### Module III

Hidden Markov methods; accessing and comparing classification algorithms; combining multiple learners; reinforcement learning. Mining association rules in large data bases, application and trends in Data mining

### Text books:

- Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques: Concepts and Techniques, Elsevier, 2011

### Reference:

- Yazdani, Sima ; Wong, Shirley., Data warehousing with oracle: an administrator's hand book. - New delhi: Addison-wesley, 1999.
- Berson, Alex; Smith, Stephen; Thearling, Kart., Building data mining applications for CRM. - TMH, 2000.
- Alpaydin, Ethem., Introduction to machine learning. - Prentice-Hall of India, 2004.

## COS506 MICRO PROCESSORS AND MICROCONTROLLER

### Module I

Architecture-General 8-bit microprocessor and its architecture-8085. Functional block diagram-architecture functions of different sections. Instruction Sets- Instruction format - addressing modes-instruction set of 8085 CPU - Instruction cycle-timing diagrams-different machine cycles-fetch and execute operations-estimation of execution time.

### Module II

Assembly Language Programming-Assembly Format of 8085-Code conversion: BCD to binary, Binary to BCD conversion-Stack and Subroutines: RST instructions, Conditional Call and Return Instructions, Advanced Subroutine concepts. Data Transfer and Interfacing: Data Transfer Schemes-Programs I/O.8085 interrupts - interrupt priority management, hardware interrupts, interrupt priorities, software interrupts and applications, Direct Memory Access Serial I/O.

### Module III

The 8051 Microcontrollers-Microcontrollers and embedded processors, Overview of the 8051 family.8051 Assembly Language Programming-Inside the 8051, Registers, Instructions.

Introduction to 8051 Assembly Programming, Assembling and Running an 8051 program. The Program Counter and ROM space in the 8051, 8051 Data types and directives..8051 Register banks and stack. JUMP,LOOP and CALL Instructions. I/O Port programming,8051 Addressing Modes, Arithmetic and logic Instructions and Programs.

**Text books:**

- Gaonkar R.S., Microprocessor architecture Programming and application, Wiley Eastern Ltd.,New Delhi.
- The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi,Janice Gillispie Mazidi, Pearson Education Asia, Fifth Indian Reprint 2009.

**Reference:**

- Mathur A.P., Introduction of Microprocessors, Tata McGraw Hill Publishing Co.Ltd., New Delhi.
- Mohamed Rafiquzzaman "Introduction to Microprocessors and Microcomputer-Based System Design" 2nd edition, CRC Press.

## COS507 WIRELESS COMMUNICATIONS AND NETWORKS

### Module I

Overview of Wireless networks-Characteristics of the Wireless Medium-physical layer alternatives for wireless networks-wireless medium access alternatives. Network planning-Wireless Network Topologies – Cellular Topology - Cell fundamentals - Capacity expansion techniques – Network Planning for CDMA Systems- wireless network operation- Mobility Management – Radio Resources and Power Management – Security in Wireless Networks.

### Module II

GSM and TDMA Technology - CDMA technology – Reference Architecture – IS 95 and IMT 2000 - Mobile Data Networks – Data oriented CDPD Network – GPRS and Higher data rates - SMS in GSM – Mobile Application Protocols. Introduction to wireless LAN- IEEE 802.11x, WLAN-wireless ATM and HIPERLAN.

### Module III

Ad hoc Networking – routing- static and dynamic-examples – WPAN-Wireless Geo location – Wireless Geo location System Architecture.

**Text books:**

- Kaveh Pahlavan, Prashant Krishnamurthy., Principles of Wireless Networks.- Pearson Education, 2002.
- Stallings, William., Wireless Communications and Networks.- Pearson Education, 2002.
- Rappaport, Theodore S.,Wireless Communications: principles and practice.- Pearson Education, 2002.

**Reference:**

- Mallick,Marty., Mobile and Wireless Design Essentials.- Wiley, 2003.
- Feher, Kamili., Wireless Digital Communications.-Prentice Hall of India, 2002.
- Black, Toy ..,Wireless Communication Technology.- Thomson Learning 2001.

## COS508 PARALLEL PROCESSING

### Module I

Overview-Parallel Computing, Use of Parallel Computing. Concepts and Terminology, Von Neumann Computer Architecture, Flynn's Classical Taxonomy, Some General Parallel Terminology, Limits of Parallel Programming, Parallel Computer Memory Architectures-shared Memory, distributed Memory, Hybrid Distributed- Shared Memory.

### Module II

Parallel Programming Models-Overview, Shared Memory Model, Threads Model, Distributed Memory / Message Passing Model, Data Parallel Model, Hybrid Model, SPMD and MPMP, Parallel Virtual Machine(PVM) and Message Passing Interface(MPI) libraries and calls, Advanced Architectures.

### Module III

Designing Parallel Programs-Automatic vs. Manual Parallelization, Understand the Problem and the Program, Partitioning, Communications, Synchronization, Data Dependencies, Load Balancing, Granularity, I/O, Performance Analysis and Tuning. SIMD computers: SIMD perspectives, array and associative processors.

#### Text books:

- Blaise Barney, Lawrence Livermore Introduction to Parallel Computing National Laboratory 2008
- HaiHwange&Briggs-Computer Architecture and parallel processing

#### Reference:

- Selim G.AKL - The Design and Analysis of parallel Algorithms - PHI.
- Mechael Quinn - Parallel Algorithms - McGraw Hill.

## COS509 NEURAL NETWORK AND FUZZY SYSTEMS

### Module I

Introduction to Biological and Artificial Neuron Models, Characteristics of ANN, Potential Applications of ANN. Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN - Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules.

### Module II

Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem. Derivation of Backpropagation (BP) Training, Summary of Backpropagation Algorithm. Introduction to associative memories, Instance/Memory Based Learning Algorithms.

### Module III

Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

#### Text books:

- Rajasekharan,Rai, Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and

applications, PHI Publication.

- Jacek M. Zuarda, Introduction to Artificial Neural Systems - Jaico Publishing House, 1997.

**Reference:**

- Yadaiah, S. Bapi Raju, Neural and Fuzzy Systems: Foundation, Architectures and Applications, - Pearson Education
- James A Freeman, Davis Skapura, Neural Networks, Pearson, 2002.
- Simon Hykins, Neural Networks, Pearson Education
- C.Eliasmith, CH.Anderson , Neural Engineering by, PHI
- Bork Kosk, Neural Networks and Fuzzy Logic System, PHI Publications

## COS514 EMBEDDED SYSTEMS

### Module I

Embedded Systems - Hardware Fundamentals Gates - Timing Diagrams - Memory - Microprocessors - Buses - DMA - Interrupts - UART - Other Communication Ports - Interrupts - Interrupt basis - Shared Data Problem - Interrupts Latency. Software Architecture - Round-Robin, Round-Robin with Interrupt - Function Queue Scheduling Architecture - Real-Time System Architecture.

### Module II

Introduction to Real Time Operating Systems - Tasks -Task states - Semaphores and Shared Data. Operating Systems Services - Message Queue, Mailboxes and Pipes - Timer Functions - Events - Memory Management - Interrupt Routines in RTOS Environment. Basic Design Using a RTOS - Overview - Principles - Encapsulating Semaphores and Queues.

### Module III

Embedded Software Development Tools - Host and Target Machines - Linkers/Locaters for Embedded Software - Getting Embedded Software into the Target System - Debugging Techniques - Testing on your Target Machine - Instruction Set Simulators.

**Text books:**

- David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.

**Reference:**

- Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw Hill, First reprint 2003

## COS5011 CRYPTOGRAPHY AND NETWORK SECURITY

### Module I

Symmetric Cipher Models- Substitution techniques- Transposition techniques-Rotor machines- Steganography - DES: Simplified DES- Block Cipher principals- The Data Encryption Std.. The Strength of DES- Differential and linear Cryptanalysis- Block Cipher Design principles. AES: Basic Structure- Primitive operation- Inverse Cipher- Key Expansion, Rounds, Inverse Rounds.

### Module II

Public key Cryptography and RSA functions:- Principles of Public key Cryptography

Systems- RSA algorithms- Key Management - Diffie-Hellman Key Exchange, Authentication requirements- Authentication functions- Message authentication codes- Hash functions- Security of Hash functions and MACS- Digital signatures- Authentication protocols- Digital signature standards.

### **Module III**

Network Security - Authentication Applications: Kerberos – X.509 Authentication Service – Electronic Mail Security – PGP – S/MIME - IPSecurity – Web Security. System level Security – Intruder - Intrusion Detection – Password Management – Viruses and Related Threats – Virus Counter Measures – Firewall Design Principles – Trusted Systems.

#### **Text books:**

- William Stallings Cryptography and Network Security–3rd ed., Principles& Practice., Pearson Education
- Atul Kahate Cryptography and Network Security Tata Mc Graw-Hill 2003
- Jianying Zhou, Moti Yung – Applied Cryptography and Network Security 8th Edition, 2010

#### **Reference:**

- Charlie Kaufman, Radia Perlman, Mike Speciner , Network Security- Private Communication in a Network World, 2nd ed., Pearson Education
- John Ioannidis, Angelos Keromytis, Moti Yung Applied Cryptography and Network Security ,Springer 2005

## **COS5012 CLOUD COMPUTING**

### **Module I**

Overview of Distributed Computing - Trends of computing, Introduction to distributed computing, Next big thing: cloud computing, Cloud Computing -Properties & Characteristics, Service models, Deployment models

### **Module II**

Infrastructure as a Service (IaaS)- Resource Virtualization( Server, Storage, Network), Platform as a Service (PaaS) - Cloud platform & Management(Computation,Storage), Software as a Service (SaaS)- Web services, Web 2.0, Web OS

### **Module III**

Cloud issues and challenges- Cloud provider Lock-in, Cloud Security-Infrastructure Security, Data security and Storage, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

#### **Text books:**

- Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

#### **Reference:**

- Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
- Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012

- Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

## COS5013 SOFTWARE PROJECT MANAGEMENT

### Module I

Introduction- Conventional Software Management - Evolution of Software Economics - Improving Software Economics - Conventional versus Modern Software Project Management.

### Module II

Software Management Process Framework- Lifecycle Phases - Artifacts of the Process - Model Based Software Architectures - Workflows of the Process - Checkpoints of the Process. Software Management Disciplines - Iterative Process Planning - Organisation and Responsibilities - Process Automation - Process Control and Process Instrumentation - Tailoring the Process.

### Module III

Managed And Optimized Process - Data Gathering and Analysis: Principles of Data Gathering, Data Gathering Process, Software Measures, Data Analysis - Managing Software Quality -Defect Prevention. Case Studies -COCOMO Cost Estimation Model- Change Metrics-CCPDS-R.

### Text books:

- Walker Royce "Software Project Management - A Unified Framework ", Pearson Education, 2004
- Humphrey, Watts: "Managing the software process ", Addison Wesley, 1989.

### Reference:

- Ramesh Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
- Bob Hughes, Mikecotterell, "Software Project Management", 3rd Edition, Tata McGraw Hill, 2004.

## COS5014 NETWORK ADMINISTRATION AND MANAGEMENT

### Module I

Network Administration-Introduction, Managing Hardware Devices & Drivers, Switches, Routers, Bridges, Hubs and gateways, Managing Network Protocols & Services, Managing Domain Name System, Managing DHCP, Managing Network Address Translation (NAT), Internetworking, Internet Protocol, IP Routing, Virtual LANs (VLANs), Managing Traffic in network, Classfull and Classless addressing, ADSL and Modems, System backup and utilities.

### Module II

Introduction to Unix and Windows server, Network Information Services - Configuring Network Services and Security, Apache, Samba, NFS, FTP, SSH. Linux System Administration- Linux File system Administration, the File system Hierarchy Standard, file and directory management commands, finding files, linking files, mounting files, file and directory permissions and ownership and special permissions, the /dev directory and device files, Networking with Linux-TCP/IP, port mapping, Ethernet, PPP.

### **Module III**

Network Management: Introduction, Network monitoring and traffic flows; Performance Monitoring: Monitoring disk usage and performance, Securing Your Server and Network. Restricting user access to the network, password properties, and intruder lockout. Protecting servers and workstations from viruses, firewall technologies, Firewall and Gateway configuration - iptables , fwbuilder , Caching servers and proxy servers - squid. Network Performance- Queuing, Buffering, Error Rates, retransmission, Backup/Recovery, Restoring file system.

#### **Text books:**

- Bozidar Levi , UNIX Administration: A Comprehensive Sourcebook for Effective Systems & Network Management, CRC press, 2001
- Tony Bautts, Terry Dawson, Gregor N. Purdy, Linux Network Administrator's Guide, O'Reilly, 2005
- Smith , Linux Network Security, Shroff Publishers.

#### **Reference:**

- Craig Hunt, Robert Bruce Thompson, Windows NT TCP/IP Network Administration, O'Reilly, 1998
- Craig Hunt, TCP/IP Network Administration, O'Reilly, 2002
- John M Lusa, The Network Manager's Handbook, CRC press, Third Edition, 2001
- Thomas R Peltier , Information Security Policies, Procedures, and Standards: Guidelines for Effective Information Security Management, CRC press, 2001
- Kurose,James F ; Ross,Keith W , Computer networking: a top-down approach featuring the internet. - Addison-Wesley, 2001.
- William Stallings, Data and Computer Communications,Pearson

## **COS5015 CYBER SECURITY AND CYBER LAW**

### **Module I**

Information System Threats and attacks, Classification of Threats and Assessing Damages, Security in Mobile and Wireless Computing- Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security, Basic Principles of Information Security, Confidentiality, Integrity Availability. Access Control- Biometrics, Factors in Biometrics Systems, Benefits, Criteria for selection of Biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges

### **Module II**

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies Network Security- Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection Virtual Private Networks- Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN

### **Module III**

Security metrics- Classification and their benefits Information Security & Law, IPR, Patent Law, Copyright Law, Legal Issues in Data mining Security, Building Security into Software Life Cycle Ethics- Ethical Issues, Issues in Data and Software Privacy Cyber Crime Types & overview of Cyber Crimes

#### **Text books:**

- Godbole, "Information Systems Security", Willey
- Merkov, Breithaupt, "Information Security", Pearson Education

#### **Reference:**

- Yadav, "Foundations of Information Technology", New Age, Delhi
- Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
- Sood, "Cyber Laws Simplified", Mc Graw Hill
- Furnell, "Computer Insecurity", Springer
- IT Act 2000