SYLLABUS

Master of Computer Applications

1st SEMESTER

Session 2020 - 2021

Mission of SCS&IT, DAVV

To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.

To produce international quality IT professionals, who can independently design, develop and implement computer applications.

Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

School of Computer Science & IT,
Devi Ahilya Vishwa Vidyalaya, Indore
www.scs.dauniv.ac.in

Course Name MCA 1st Semester
Subject Code: IC-4916
Subject Name: Communication Skills and Report Writing

Aim of the Subject

To improve the confidence, communication skills and presentation capabilities of students that will help them in placements and corporate life.

Objectives

To develop effective communication skills in students which will help them in facing interviews and group discussions

Learning Outcomes

1. Improved skills in personal interviews and group discussions
2. Development of power of expression

Unit 1

Basics of Communication

Unit 2

Development of Group Discussion Skills

Unit 3

Development of Presentation Skills and facing interviews

Unit 4

Basics of Written Communication

Unit 5

Intense practice of Presentations, Group Discussions and Interviews

Text Book(s)

1. Communication – K. K. Sinha
2. Organizational Behavior - Fred Luthans
3. Organizational Behavior - Stephen Robbins

Reference Material(s)

1. Communications Skills – M.V. Rodrigues
2. Times of India/ Hindustan Times/ The Hindu etc.

Course Name MCA 1st Semester
Subject Code: CS-4122
Subject Name: Mathematical Foundation for Computer Application

Aim of the Subject

To develop logical and mathematical concepts commonly required in many areas of Computer Science.

Objectives

1. To be familiar with Propositions, Predicates and Set theory.
2. To provide the concept of Vector Spaces and Vector Subspaces those are mandatory in the area of Machine Learning.
3. To be able to form a strong base of Mathematical Induction and Recurrence Relations, so as to implement them easily in algorithms.
4. To understand Functions and Relations and consequently, their importance in Computer Science.
5. To explore Probability and Statistical analysis that will help in various applications of Computer Science.

Learning Outcomes

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Unit 1

Logics, Prepositions, Predicates and Quantifiers. Introduction to Set theory, Set Operations, Fuzzy Sets.
Introduction to Vector Spaces, General properties of Vector Spaces, Vector Subspaces.
Introduction to methods of Proof, Mathematical Induction, use of Mathematical Induction to solve different problems.

Unit 2

Functions, One-to-One Functions, Onto Functions, Inverse Function, Composition of Functions. Recurrence Relations, solving Recurrence Relations, Applications of Recurrence Relation. Basic understanding of Complexities, Complexity and analysis of various basic algorithms.

Unit 3

Relation, importance of Relations in Computer Science, properties and applications of Relations, Closures of Relations, Equivalence Relations, representing Relations, Relation matrix, Relation graph, Composite relation, Operations on relations- union, intersection and join.

Unit 4

Correlation, Coefficient of Correlation, Rank Correlation, Partial and Multiple Correlations. Regression, Regression Coefficient, Lines of Regression. Curve fitting, methods of Least Square for fitting different Curves.

Unit 5

Conditional Probability, Bayes' Rule, Discrete and Random variables. Discrete Probability Distributions- Binomial Distribution, Poisson Distribution, Uniform Distribution etc. Continuous Probability Distributions- Rectangular, Gaussian Distribution, Gamma Distribution, Beta Distribution etc.

Text Book(s)

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, McGraw-Hill Education, ISBN: 9780070681880, 0070681880
2. S.C. Gupta, V.K. Kapoor, "Fundamentals of Mathematical Statistics", 12th Edition, Sultan Chand & Sons, ISBN: 9789351611738, 9351611736
3. David C. Lay, "Linear Algebra and Its Applications", Pearson Education Limited, 4th Edition, ISBN: 9781292020556, 1292020555

Reference Material(s)

1. Jay L. Devore, Kenneth N. Berk, "Modern Mathematical Statistics with Applications", 2nd Edition, Springer New York, ISBN: 9781461403913, 146140391X
2. Vijay K. Rohatgi, A. K. Md. Ehsanes Saleh, "An Introduction to Probability and Statistics", 3rd Edition, Wiley.
3. Seymour Lipschutz, Marc Lipson, "Schaum's Outline of Discrete Mathematics", 3rd Edition, McGraw-Hill Education, ISBN: 9780071511018, 0071511016
4. V. K. Balakrishnan, "Introductory Discrete Mathematics", Dover Publications, ISBN: 9780486140384, 0486140385.

Electronic Materials

- https://nptel.ac.in/courses/106/103/106103205/
- https://nptel.ac.in/courses/106/105/106105192/
- https://nptel.ac.in/courses/111/107/111107137/
- https://nptel.ac.in/courses/111/106/111106135/
- https://nptel.ac.in/courses/111/106/111106112/

Course Name MCA 1st Semester
Subject Code: CS-4209
Subject Name: Data Structures using C++

Aim of the Subject

The aim of this course is to give you a feel for algorithms and data structures.student should end it appreciating that understanding the algorithm and data structures used for some problem is much more important than knowing the exact code for it in some

Objectives

The objectives are that student should know something of all of these by the end of the course. Student should be aware of algorithms and data structures: sorting and searching algorithms, categorizing efficiency in time and memory use, linked list and tree data structures, hash tables, stacks and queues. As well as knowing about them, student should be familiar enough with the concepts that should you need to take any of them further and make use of them, student will be able to do so.

Learning Outcomes

Student writes generalized code expressing an algorithm or data structure in a way that may be used in a variety of real-world situations. Come to know how to work out the efficiency of an algorithm, though we won't cover detailed formal analysis.

Unit 1

Introduction to Data Structure: Concepts of Data and Information, Classification of Data structures, Abstract Data Types, Data structures operations. Algorithms, Algorithm complexity notations like big Oh, Theta, and Omega. Time Complexity, Big –Oh -notation, Running Times, Best Case, Worst Case, Average Case, Factors depends on running time. Implementation aspects: Memory representation. Static and Dynamic implementations. Examples and real life applications, Data Structures: Arrays, Address calculation in a single and multi dimensional array, Sparse Matrices, Pointer & Structure.

Unit 2

Stacks, Queues and Lists Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples : Infix, postfix, prefix representation, Applications : Mathematical expression Evaluation Definition: Queues & Lists: Array based implementation of Queues / Lists, Linked List implementation of Queues / Lists, Circular implementation of Queues and Singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority queues , Applications.

Unit 3

Trees & Graphs Definition of trees and Binary trees, Properties of Binary trees and Implementation, Binary Traversal; pre-order, post-order, in-order traversal, Binary Search Trees, Implementations, Threaded trees, AVL Trees, Implementations , Balanced multi way search trees, Applications Definition of Undirected and Directed Graphs and Networks, The Array based implementation of graphs, Adjacency matrix, path matrix implementation, The Linked List representation of graphs, Shortest path Algorithm, Graph Traversal –Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Applications.

Unit 4

Introduction to Recursion, Divide and Conquer Algorithm, Evaluating time Complexity. Straight Sequential Search, Binary Search, non –recursive Algorithms, recursive Algorithms, Indexed Sequential Search. Definition, Hash function, Collision Resolution Techniques, Hashing Applications.

Unit 5

Sorting Algorithms Introduction, Sorting by exchange, selection, insertions, Bubble sort, Selection sort, Insertion sort, Efficiency of algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays, The merge sort Algorithms, Quick sort Algorithm, Analysis of Quick sort, Picking a Pivot, A partitioning strategy, Heap sort, Heap Construction, Heap sort, bottom –up, Top –down Heap sort approach, Radix sort.

Text Book(s)

1.Data Structures using C by A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub, 6thEdition.
2.How to Program C++ by Paul Deitel , Harvey Deitel, Prentice Hall; 8 edition.

Reference Material(s)

1.Theory & Problems of Data Structures by Jr. Symour Lipschetz, Schaum'soutline by TMH 2006,Special Indian Edition.
2.Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and T.D. Ullman, Original edition, Addison-Wesley, 1999, Low Priced Edition.
3.Fundamentals of Data structures by Ellis Horowitz & Sartaj Sahni, Pub, 1983,AW, 1st Edition.
4.Data Structures and Program Design in C By Robert Kruse, PHI, 2nd Edition.

Course Name MCA 1st Semester
Subject Code: CS- 5511
Subject Name: OPERATING SYSTEMS

Aim of the Subject

• general understanding of structure of modern computers purpose, • structure and functions of operating systems • Illustration of key OS aspects by example

Objectives

1. To provide opportunity for the study of modern methods of information processing and its applications;
2. To acquaint students with knowledge of the computer systems with emphasis on their uses and limitation;
3. To develop among students the programming techniques and the problem solving skills through programming;
4. To foster among students an interest and confidence in using computers;
5. To encourage an understanding of the implications of computers in the modern world;
6. To prepare students who wish to go on to further studies in computer science and related subjects.

Learning Outcomes

By the end of the course student should be able to describe the general architecture of computers describe, contrast and compare differing structures for operating systems understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files.

Unit 1

Introduction: Evolution of operating systems, operating system concepts; activities, functions and services of operating system; Computer Systems: Mainframe, Desktop, Multiprocessors, Distributed, Clustered, Real time and Hand held systems. Computer System Operations, Storage hierarchy, Hardware protection, System calls, System structures. Process Management: Process concepts, Process scheduling, Operation on processes.

Unit 2

Cooperating processes, Inter-process communication. Threads: multithreading models, threading issues, thread examples. CPU Scheduling: concepts, scheduling criteria, scheduling algorithms, algorithm evaluation. Process synchronization: Critical section problem, Mutual exclusion and synchronization Techniques of inter process: Synchronization hardware, semaphore, classical problems of

synchronization, critical regions and monitors. Deadlock: deadlock characterization, deadlock handling methods.

Unit 3

Memory Management: Concepts, single user memory management. Partition memory allocation: paging, segmentation and segmentation with paging, Virtual memory management: concept, demand paging, process creation, page replacement, allocation of frames and thrashing.

Unit 4

File Management: File concepts, access methods, directory structure, file system mounting, sharing and protection of files. File system structure and implementation, allocation methods, free space management, reliability of file system. Unix file system.

Unit 5

Device Management: Goals of input/output software design, Structure of device hardware and software. Layers of I/O software, structure of device drivers, Disk driver, disk arm scheduling algorithms, terminal driver, clock driver etc.

Text Book(s)

1. A. Silberschatz, P. Galvin and Gagne, Operating System Concepts, Addison Wesley, 6th Edition, 1994.

Reference Material(s)

1. Operating systems, 4rth Edition, William Stallings, Pearson Education, 2003.

Course Name MCA 1st Semester
Subject Code: CS-4009
Subject Name: Computer Organization and Architecture

Aim of the Subject

This course aims to give an understanding of the basic computer architecture, leading to strong foundation of assembly language, operating system, compilation process, performance aspects of software, IOT & Cloud Computing.

Objectives

- To develop understanding of core concepts of computer architecture from instruction execution viewpoint & memory interaction leading to basics of assembly language programming
- To develop understanding of different architectural styles, pipelining, various memory technologies
- To build foundation of IOT & Cloud basics from architecture point of view

Learning Outcomes

1. Students should understand the computer architecture, CPU-memory interaction, instruction execution process through assembly language of 8088 microprocessor.
2. Students should be able to understand different CPU Architectures like instruction pipelines, RISC/CISC, Cache memory, placement/replacement policies, cache coherence issues, memory technologies.
3. Students should be able to learn the basic concepts of IOT & Cloud so as to build strong foun-dation of these subjects from computer architecture point of view

Unit 1

Computer Organization: Digital and Analog computers, Major components of a digital computer, Memory addressing capability of a CPU, Word length of a computer, Processing speed of a CPU. Technological trends. Von Neumann model, Functional units and components in computer organization: The memory unit, the input and output subsystem, the bus structures, design of ALU in context of 8088 microprocessor.

Unit 2

Introduction to 8088 Microprocessor: Architecture, Register Architecture: Accumulator, GPR, PC, IR, SP and Flag Register. Various instruction classification: Instruction Format, Opcode, Operand and Hex code. Addressing modes, Introduction to Assembly Language Programming: Instruction Operation Status, Various Instruction Sets: Data Transfer Group Instructions, Arithmetic Group

Instructions, Logical Group Instruction, Branch Group Instructions: Conditional and Unconditional and Machine control Instructions, interrupts, Direct memory access.

Unit 3

Micro-Operations, Functional Requirements, Processor Control, Hardwired Implementation, Micro-programmed Control, Introduction to RISC and CISC Architecture, Instruction pipelining: Instruction pipelining hazards, data dependency hazards and control hazards, overcoming hazards. Internal Memory: RAM, SRAM and DRAM, Interleaved and Associative Memory, Cache Memory: Data caches, instruction caches and unified caches, cache implementations, fully associative and direct mapped caches, write back versus write through caches.

Unit 4

Understanding IoT fundamentals, IoT architectures and protocols, Working of sensors and actuators, , Sensor Networks, Machine-to-Machine Communications, Interfacing with Arduino, Raspberry Pi, NVIDIA Jetson Nano (GPU) etc., Cloud platform for IoT, IoT Applications.

Unit 5

Grid Computing : data and computational grids, Grid architecture and its relations to various distributed technologies, Cloud computing : Evolution of cloud computing, Comparison with traditional computing architecture (client/server), Services provided at various levels, Parallel Computing : Flynn's Classification of Computer Architecture, Types of Parallelism, Parallel programming models.

Text Book(s)

1. Computer System Architecture, M. Morris Mano, Pearson Education.
2. Computer Organization & Architecture, William Stallings, 8e, Pearson Education.
3. Microprocessor Architecture, Programming and Applications with 8085/8080 by Ramesh S. Gaonkar.
4. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
5. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
6. Andrew S. Tanenbaum, Maarten Van Steen, "Distributed System: Principles & Paradigms, Prentice Hall, 2007.

Reference Material(s)

Online Material will be provided as and when required.