CS201 Data and File Structures

Course prerequisites: CS101

Course contents:

Introduction **(10%)**

Introduction using the three level Approach – Application/User, Abstract/Logical and Implementation/Physical. Three level approach to be applied to understand Arrays, Structures and Unions. Space Time trade-off concept

Linear Data Structures **(25%)**

Array application and representations: Polynomials, Sparse matrices, String-pattern Matching

Linked Lists: Linked list applications, Representation and Implementation, Use of Header and Trailer Nodes, Doubly linked list, Circular linked list

Stack and Queues: Need and justification of the study, Representation and implementation, Multiple stacks and queues, Implementation of recursion using stack.

Nonlinear Data Structures **(30%)**

Trees: Definitions, terminologies and properties, Binary tree representation, traversals and applications, Threaded binary trees, Binary Search Trees, AVL Trees, M-way Search Trees, B-trees, B*-trees, B+-trees, Optimum binary search trees, Multidimensional binary search trees

Graphs: Graph representations; Graph Traversals

Priority Queues, Heap Structures, Binomial Heaps, Leftist Heaps

Complexity of Sort and Search Algorithms **(10%)**

Heap sort, Merge sort, Quick-sort, Hashing, General radix sort, Symbol tables, Sequential search, Binary search, Interpolation search, Tries

File organization and Processing **(25%)**

Sequential files: Organization, Creation, Update and Maintenance; Relative files: Organization, Hashing techniques: Approaches to collision problem, Creation, retrieval and update; Indexed sequential files: organization, Creation, Update and Maintenance, Multi-key files, Inverted file, Multi-list file, Alternate key, Tree structured files: B-trees, AVL-trees, Tries

Main Reading

1. J. B. Dixit, Mastering Data Structures Through C Language, First Edition, University Science Press, 2010
2. Richard F.Gilberg and Behrouz A.Forouzan Data Structure - A Pseudocode Approach with C -First Reprint -Thomson,2002

Supplementary Reading

1. Aho, Hopcroft, Ullman, Data Structures and Algorithms, Addison Wesley, 1983.
2. R. L. Kruse, Data Structures and Program Design, 3rd ed., Prentice-Hall, 1994.
3. Mary E. S. Loomis, Data Management and File Structures, 2nd ed., Prentice-Hall, 1989.
4. Clifford A. Shaffer, A practical Introduction to Data Structures and Algorithm Analysis, Prentice-Hall, 1997.
5. Kruse, Tondo and Leung, Data Structures and Program Design in C, 2nd edition, Prentice-Hall, 1997.