Course Name : Data Structure and Algorithm

Course Code : CS(EE)401

Course Credit: 3

Contact Hour: 3L-1T

Prerequisite: Computer Fundamentals & Principle of Computer Programming

Engineering Mathematics

Course Objective

The objectives of this course are

1. Analyze the asymptotic performance of algorithms.
2. Demonstrate a familiarity with major algorithms and data structures.
3. Apply important algorithmic design paradigms and methods of analysis.
4. Synthesize efficient algorithms in common engineering design situations

Course Outcome

On completion of the course students will be able to

1. Analyze the problem complexity.
2. Use different kinds of data structures which are suited to different kinds of applications, and some are highly specialized to specific tasks. For example, B-trees are particularly well-suited for implementation of databases, while compiler implementations usually use hash tables to look up identifiers.
3. Manage large amounts of data efficiently, such as large databases and internet indexing services.
4. Use efficient data structures which are a key to designing efficient algorithms.
5. Use some formal design methods and programming languages which emphasize on data structures, rather than algorithms, as the key organizing factor in software design.
6. Store and retrieve data stored in both main memory and in secondary memory.

CO Mapping with departmental POs

H: High, M: Medium, L: Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	H	H	H	H	H				H			H
CO 2	H	H	H	H	H				H			H
CO 3	H	H	H	H	H				H			H
CO 4	H	H	H	H	H				H			H
CO 5	H	H	H	H	H				H			H
CO 6	H	H	H	H	H				H			H

Course Content:

Module I: **7L**

Overview of C language: Array, Pointer, Structure, Function

Module II: **3L**

Time and Space analysis of Algorithms: - Order Notations.

Module III: **7L**

Linear Data Structures - Sequential representations - Arrays and Lists, Stacks, Queues and Dequeues, Application.

Module IV: **8L**

Linear Data Structures - Link Representation - Linear linked lists, circularly linked lists. Doubly linked lists, application.

Module V: **10L**

Non-linear Data Structure: Trees - Binary Trees, Traversals and Threads, Binary Search Trees, Insertion and Deletion algorithms, Height balanced and weight-balanced trees, B-trees, B+ trees, Application of trees; Graphs - Representations, Breadth-first and Depth-first Search.

Hashing - Hashing Functions, collision Resolution Techniques.

Module VI: **5L**

Sorting and Searching Algorithms- Bubble sort, Selection Sort, Insertion Sort, Quick Sort.

Module VII: **5L**

File Structures - Sequential and Direct Access. Indexed Files - B+ tree as index. Multi-indexed Files, Hashed Files.

Text Books:

1. Data Structures and Algorithms – O.G. Kakde & U.A. Deshpandey, ISTE/EXCEL BOOKS
2. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., “Data Structures and Algorithms”, Addison Wesley
3. Drozdek- Data Structures and Algorithms, Vikas

Reference Books:

1. Heileman: Data structure algorithms & Oop Tata McGraw Hill
2. Data Structures Using C – M. Radhakrishnan and V. Srinivasan, ISTE/EXCEL BOOKS
3. Weiss Mark Allen, “Algorithms, Data Structures, and Problem Solving with C++”, Addison Wesley.
4. Horowitz Ellis & Sartaj Sahni, “Fundamentals of Data Structures”, Galgotria Pub.
5. Tanenbaum A. S. , “Data Structures using ‘C’ ”
6. Ajay Agarwal: Data structure Through C. Cybertech