

NIRMA UNIVERSITY
Institute of Technology
B. Tech. Computer Science and Engineering
Open Elective

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Course Code	XXXX
Course Name	Data Structures

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. illustrate various data structures for efficient data storage and retrieval
2. correlate various data structure in algorithm design
3. analyse various searching, sorting, and indexing algorithms

Syllabus:

**Teaching
Hour**
02

Unit I

Introduction to Data Structures: Types of Data Structures, Linear & non linear data structures

Unit II

Linear data structures & their sequential storage representation:

Storage Structures for arrays, introduction to stack, operations and applications of stack, Introduction to queue, operations of queue, operations and applications of queue, Linked list basics, types, operations and applications

06

Unit III

Non Linear data structures: Trees-Definitions and concepts, operations on Binary Trees, Storage Representation and Manipulation of Binary Trees-Linked & Threaded, Conversion Of General Trees To Binary Trees, Sequential and other representations of trees, applications of Trees-the Manipulation of Arithmetic Expressions, Multi Linked Structures-Sparse Matrices.

06

Unit IV

Graphs-Matrix: Graphs-Matrix representation of graphs, Breadth First Search, Depth First Search, Spanning Trees.

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Unit V

Sorting: Sorting-Notation and Concepts, Time and Space Complexity, Asymptotic behaviour, Sorting: Insertion Sort, Selection Sort, Bubble Sort, Merge Sort, Tree Sort, Quick Sort, Shell Sort, Radix Sort, Address Calculation Sort, Summary of Sorting.

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Unit VI**03**

Searching: Searching-Sequential & Binary Searching, Search Trees-Height Balanced, Weight Balance, 2-3 Trees, Tree Structures.

Unit VII**03**

Hashing: Hash Table Methods-Introduction, Hashing Functions, and Collision-Resolution Techniques.

Unit VIII**04**

File Structure: Definition of Record, File, Blocking, Compaction and Database, introductory overview of Database Management System, Implementation and Traders of Sequential Access, Index Sequential Access, Random Access, B-Trees, Inverted List and Multi list.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory work will be based on applications of above syllabus with minimum 10 experiments to be incorporated.

Suggested Readings[^]:

1. Peter Brass, Advanced Data Structures, Kindle Edition
2. Ellis Horowitz and SartajSahni, Fundamentals of Data Structures

L=Lecture, T=Tutorial, P=Practical, C=Credit

[^]this is not an exhaustive list

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