

Data Structures and Algorithms

Prepared by Prof. Shereen Taie

IT251
Information Technology Department

Orientation



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Course Outcome



- Students gain a solid foundation in **designing, implementing, and analyzing algorithms and data structures**, essential for **efficient problem-solving in programming and software development.**

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Course Syllabus

1. Introduction to Data Structures and Algorithms
 - Overview of fundamental concepts.
 - Importance of data structures in software development.
 - Basics of algorithmic thinking.
2. Arrays and Linked Lists
 - Implementation and manipulation of arrays.
 - Singly and doubly linked lists.
 - Time and space complexity analysis.
3. Stacks and Queues
 - Understanding stack and queue data structures.
 - Applications and practical implementation.
 - Evaluating efficiency in different scenarios.

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Course Syllabus (Cont.)

4. Trees and Graphs

- Binary trees and their variants.
- Graph representation and traversal.
- Tree and graph algorithms.

5. Sorting and Searching Algorithms

- Comparison of sorting algorithms (e.g., Bubble Sort, Quick Sort, Merge Sort).
- Searching techniques (e.g., Linear Search, Binary Search).
- Analysis of algorithmic complexity.

6. Algorithmic Paradigms

- Divide and conquer strategies.
- Dynamic programming principles.
- Greedy algorithms and their applications.

7. Practical Application

- Coding exercises applying learned concepts.

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Textbooks:

- "Introduction to Algorithms" by Thomas H. Cormen et al.
- "Data Structures and Algorithms in Python" by Michael T. Goodrich et al.

Thank You