DSA using Python

Chapter	Modules	Topics
1	Introduction to Data Structures and Algorithms	1. Overview of DSA 2. Importance of DSA in real-world applications 3. Basic Python concepts review 4. Introduction to Big-O notation 5. Time and space complexity analysis
2	Arrays, Lists and Tuples	1. Introduction to arrays, lists and tuples 2. Implementation in Python 3. Operations (indexing, slicing, insertion, deletion) 4. Time and space complexity analysis 5. Applications (cache implementation, dynamic programming)
3	Stacks and Queues	1. Introduction to stacks and queues 2. Implementation in Python (lists, collections. Deque) 3. Operations (push, pop, peek, enqueue, dequeue) 4. Applications (parser implementation, job scheduling) 5. Time and space complexity analysis
4	Linked Lists	1. Introduction to linked lists 2. Implementation in Python (singly, doubly, circular) 3. Operations (insertion, deletion, traversal) 4. Time and space complexity analysis 5. Applications (database query optimization, browser history)
5	Trees	1. Introduction to trees (binary, AVL, BST) 2. Implementation in Python 3. Operations (insertion, deletion, traversal) 4. Time and space complexity analysis 5. Applications (file systems, database indexing)

6	Graphs	1. Introduction to graphs (directed, undirected, weighted) 2. Implementation in Python (adjacency matrix, adjacency list) 3. Operations (traversal, shortest path) 4. Time and space complexity analysis 5. Applications (social network analysis, traffic optimization)
7	Sorting Algorithms	1. Introduction to sorting algorithms 2. Bubble sort, selection sort, insertion sort 3. Merge sort, quick sort, heap sort 4. Time and space complexity analysis 5. Applications (data analysis, database query optimization)
8	Searching Algorithms	1. Introduction to searching algorithms 2. Linear search, binary search 3. Depth-first search (DFS), breadth-first search (BFS) 4. Time and space complexity analysis 5. Applications (database query optimization, web search)
9	Dynamic Programming	1. Introduction to dynamic programming 2. Memorization, tabulation 3. Applications (Fibonacci series, longest common subsequence) 4. Time and space complexity analysis 5. Real-world applications (resource allocation, scheduling)