Curriculum: 16-Week DSA Masterclass

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Week 1	Introduction to Problem Solving
Week 2 - 5	Fundamentals of Algorithms
Week 6 - 7	Linear Data Structures
Week 8 - 12	Non-linear Data Structures
Week 13 - 16	Algorithm Design Techniques

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Week 1: Introduction to Problem Solving	
1	**Algorithm Introduction:** Properties and real-life applications.
2	**Algorithmic and Mathematical Thinking:** Steps of problem solving, problem solving guideline, problem solving warm-up using puzzles and brain teasers, math concepts for DSA.
Discussion of 15 puzzles asked in top tech companies.	
15 puzzles to practice with doubt support	

Week 2 - 5 : Fundamentals of Algorithms	
3	**Complexity analysis:** Input size, rate of growth, time complexity, Big-O notations, worst, best and average-case analysis, space complexity.
4	**Iteration:** Concept, analysis techniques, problem-solving patterns like incremental approach, two pointers, sliding window, prefix array, etc.
5	**Recursion:** Concept, analysis techniques, problem-solving patterns like decrease and conquer, divide and conquer, modified binary search, etc.
6	**Sorting:** Bubble sort, selection sort, insertion sort, merge sort, quick sort, counting sort, radix sort, comparisons of sorting algorithms, etc.
7	**Hashing:** Direct address table, hash table, hash functions, implementation, problem-solving patterns, collision resolution, etc.
Discussion of 40 questions asked in top tech companies.	
40 questions to practice with doubt support	

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Week 6 - 7: Linear Data Structures	
8	**Data Structures Introduction:** Properties, Types, Key operations, Concepts of abstract data types, real-life applications.
9	**Array and Linked List:** Properties of array and linked list, basic operations, dynamic array, singly linked list, doubly linked list, circular linked list, linked list problem solving patterns.
10	**Stack and Queue:** Design, implementation, problem solving patterns.
Discussion of 15 interview questions asked in top tech companies.	
15 interview questions to practice with doubt support.	

Week 8 - 12: Non-linear Data Structures	
11	**Binary Tree and BST:** Binary tree properties, DFS traversals, BFS traversal, problem solving patterns, BST properties and operations, BST problem solving patterns.
12	**Priority Queue and Heap:** Properties, operations, implementation, heap sort, problem solving patterns.
13	**Trie and String Algorithms:** Trie properties and operations, suffix tree, string matching, problem solving patterns.
14	**Advanced Data Structures:** Segment tree, AVL tree, LRU cache, LFU cache, Bloom filter, Other tree based data structures.
15	**Graph:** Properties, representation, BFS and DFS traversal, problem-solving patterns, topological sorting, shortest path, minimum spanning tree.
Discussion of 40 interview questions asked in top tech companies.	
40 interview questions to practice with doubt support.	

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Week 13 - 16: Algorithm Design Techniques	
16	**Dynamic Programming:** DP concepts, divide and conquer vs DP, top-down approach, bottom-up approach, patterns of 1D table, patterns of 2D and 3D table, tree based DP, optimization techniques.
17	**Greedy and Backtracking:** Greedy property, greedy problem solving patterns, DP vs greedy, exhaustive search, recursive and iterative backtracking, bit-masking.
18	**Mathematical Algorithms:** Numbers theoretic algorithms, bit manipulation, randomised algorithms, geometry based algorithms.
Discussion of 40 questions asked in top tech companies.	
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If you want to learn about the above topics through self-study, you can refer to these books and materials:

- EnjoyAlgorithms self-paced course
- Introduction to algorithms by CLRS
- Algorithms unlocked by Thomas Cormen
- Algorithm design manual by Steven S. Skiena
- Algorithms by Robert Sedgewick
- Cracking the coding interview by Gayle Laakmann
- Algorithmic puzzles (Oxford University Press)
- Math for computer science (MIT Opencourseware)

If you have any query related to curriculum, reach us via contact@enjoyalgorithms.com.

Thank you!