* Introduction to algorithms and big O notation
* Basic data structures: arrays, linked lists, stacks, queues
* Sorting algorithms: bubble sort, insertion sort, selection sort, merge sort, quick sort
* Searching algorithms: linear search, binary search
* Recursion and recurrence relations
* Time and space complexity analysis
* Advanced data structures: trees (binary, AVL, red-black), heaps, hash tables
* Graph algorithms: depth-first search, breadth-first search, shortest path algorithms (Dijkstra, Bellman-Ford)
* Dynamic programming
* Greedy algorithms
* Divide and conquer algorithms
* Randomized algorithms
* Approximation algorithms
* NP-completeness and the theory of NP-hard and NP-complete problems