

Final Exam Format

This is what you can expect the format of the exam to be like. There will be 15 questions and this document tells you exactly the topics of each question so that you can prepare accordingly.

1. Stack Implementation
2. Queue Implementation
3. Stack and Queue
 - Use cases
 - Different ways to implement
 - Implementation details
 - Time and space complexity
4. Smart Pointers
 - How different smart pointers work
 - Pointer ownership
 - Using smart pointers
5. Stability of Sorting Algorithms
6. Sorting Algorithms Complexity Analysis
 - Time complexity for best, worst, and average case
 - Space complexity for best, worst, and average case
 - Comparisons for best, worst, and average case
 - Swaps for best, worst, and average case
 - Understanding what the best, worst and average cases are
7. Search Algorithms
 - Linear search and Binary search
 - Time complexity analysis of best, worst and average case
8. Sorting Algorithms
 - State of the array after calling different algorithms
 - Number of times merge and partition is called
 - Pivot selection in quick sort
9. Recursion
 - Time and space complexity of recursive functions
 - Backtracking using recursion
 - Recursive solutions to problems and Base case

10. Dynamic Programming
 - Memoization
 - Tabulation
11. Binary Tree
 - different tree structures and how they are defined
 - understanding common terms (e.g., root, child, height, etc.)
 - different ways to traverse a binary tree
12. Binary Search Tree
 - Adding items
 - BST property and definition
13. Binary Search Tree
 - Removing items and different cases of remove
 - Maintaining BST property
14. Heap
 - Heap property
 - Modifying a heap and maintaining the heap property
 - Adding and removing from Heap
15. Binary Search Tree and Heap
 - Time and space complexity analysis of BST and heap functions
 - Heap Sort usage and analysis
 - Understanding how heap and BST are different

Note: *You should review all quizzes, lectures, study questions and projects to fully prepare for the exam. The topics mentioned here are not the only things you should review if you want to get a good grade. Review anything that you are not sure about from slides on the course webpage.*