

## Guidelines for Algorithm Design CSCI 532 for the Comprehensive Exam

1. An overview of algorithms and their place in modern computing systems.
2. Sorting algorithms – quick sort, insertion sort (uses an incremental approach), and merge sort (uses a recursive technique known as “divide-and-conquer”). Recursion tree
3. Running times of these algorithms – time and space complexity
4. Growth of Functions – asymptotic notation which we use for bounding algorithm running times from above and/or below.
5. Divide-and-conquer algorithms. Method for multiplying two square matrices. Methods for solving recurrences, which are useful for describing the running times of recursive algorithms. Master method (Master’s Theorem) – which we often use to solve recurrences that arise from divide-and-conquer algorithms.
6. Mathematical induction.
7. Single-Source Shortest Paths – Dijkstra’s algorithm, All-Pairs Shortest Paths.
8. Dynamic Programming, Greedy Algorithms