**CSCI 321 Computer Science III Summer 2019**

**Final Exam Review**

There are 5-6 comprehensive programming problems in the final exam. The topics would be involved are as follows.

1. Priority Queues and Heaps (Chapter 9, Lecture 4): Heaps (A binary tree storing keys at its nodes), Heap-order, Insertion (upheap), RemoveMin (Downheap), Array-based implementation for Heaps, (key, value) pair as element of priority queues, three main operations for priority queues: Insertation, RemoveMin, Min, Sequence-based Priority Queue (unsorted, sorted list) with associated PQ-sort and Selection-sort algorithms, Heap-based priority queue and Heap-sort.
2. Maps and Hashtables (Chapter 10, Lecture 5): A map models a searchable collection of key-value entries, Key is unique, main operations of a map: searching (get()), inserting (put()), and deleting items (remove()), Hashtables, hash functions (hash code, compression function), Collision Handling implementations (separate chaining, linear probing, double hashing).
3. Binary Search Trees, AVL Trees, Splay Trees (Chapter 11, Lecture 6): Binary Search, BST property, BST (get(), put(), remove()), BST vs Hashtable, AVL tree: Balanced BST such that the heights of the children can differ by at most 1, Insert and Remove in AVL, rebalance by trinode restructuring (4 cases, LL,LR,RR,RL), Splay tree: BST where a node is splayed (move the node to the root) after it is accessed (for a search or update), Search, Insert and Remove in Splay tree, rotation after each operation (4 cases, zig-zag…).
4. Graphs (Chapter 14, Lecture 7 part 1): Definitions of graphs, three representations for graphs, DFS & BFS and their applications, respectively.