CS 5/7350 Background Information

Critical Knowledge – Must Know	Important Knowledge – Should Know	Extra Knowledge – Should Know Some
Data Types: Arrays, Integers, Floats, Characters & Strings	Search a String for a character.	Bit field manipulation of the data types.
Data Structures: Linked Lists, Doubly Linked Lists & Trees	Insert elements into a list or tree Search a list for an element. Pre-order In-order and Post-Order traversals, Hashes	AVL Trees, min-heaps, 2-3 trees,
Coding: Able to write a program to 1. Get a random number, and display it on a number line. 2. Sort an array of random numbers 3. Create sorted linked list from a set of random numbers and print the elements of the list	**Coding:** Able to write a program to : 1. Read a set of values and place them into a Binary Search Tree 2. Traverse the tree and print the values of the nodes in order. 3. Measure the running time of your program with 1us accuracy.	**Coding:** Able to write a program to : 1. Implement a nlgn sort 2. Display a graph of 10 vertices and 25 edges. 3.
Abstract Data Types: Stack, Queue, Priority Queues	LIFO, FIFO, ADT	Implementation as Arrays Implementation as Linked Lists Implementation as min-heaps
Graphs: Edges, Vertices	Adjacency List, Adjacency Matrix, Degree, Path, Cycle, Cliques, Directed Graphs, DAGs,	Single Source Shortest Path, Euler Tour, Hamiltonian Cycle, Min Cut, Max Flow, Trees, Forests, Coloring, Isomorphism, Spanning Trees
Sorting and Searching: Know how to find the min or max.	Two $O(n^2)$ sorts and One O(nlgn) sort. How to find the median.	3 $O(n^2)$ sorts, 3 O(nlgn) sorts, radix sort, bucket sort
Number Theory: What is 11 mod 7 What are prime numbers, Factorials, Powers of 2 Sum Basic Series	nCr, nPr, log, Fibonacci sequence	$\phi(n)$ – Euler Totient Function, Calculate -2 mod 7. What are generators, fields, GCD and Chinese Remainder Theorem
Algorithm Analysis	Time, Space, Big-Oh, Recursion, Worst Case	Big-Omega, Big Theta, Dynamic Programming, NP, NP-Complete