

COMP 2140 – Data Structures and Algorithms

Calendar Description: Introduction to the representation and manipulation of data structures. Topics will include lists, stacks, queues, trees and graphs (Lab required).

Prerequisite: COMP 1020

This course is a prerequisite for: COMP 2080, COMP 2150, COMP 2280, COMP 3010, COMP 3020, COMP 3030, COMP 3170, COMP 3190, COMP 3290, COMP 3380, COMP 3430, COMP 3440, COMP 3620, COMP 3720, and COMP 4530.

Outline

- 1) Introduction to data structures and review (1/2 week)
- 2) Sorting and Recursion (1 ½ weeks)
 - Discussion of common sorting techniques (insertion, quick and radix)
- 3) Abstract Data Types (1/2 week)
 - An introduction to the fundamental design philosophy of ADTs (as classes without inheritance).
- 4) ADT List (2 ½ weeks)
 - Discussion of the general idea of a list ADT and implementation strategies.
 - Linked lists (including singly-linked, doubly-linked, circular, dummy nodes).
- 5) Stacks and Queues (2 ½ weeks)
 - Stacks and queues and implementation strategies. Prefix, infix and postfix expressions and basic algorithms.
- 6) Tables and Hashing (1 ½ weeks)
 - Discussion of the general idea of a table ADT and implementation strategies. This leads into hashing and then collision resolution schemes
- 7) Trees (2 ½ weeks)
 - Binary Trees and Search Trees. Insertion and deletion algorithms, 2-3 trees.
- 8) Priority Queue (1/2 week)
 - Discussion of the general idea of a priority queue ADT and implementation strategies. Heaps. Huffman's algorithm and/or heap sort.
- 9) Graphs (1 ½ weeks)
 - Terminology and basic algorithms. Minimum Path Search and Minimum Spanning Tree

Recommended Text: Frank M. Carrano and Janet Pritchard, *Data Abstraction and Problem Solving with Java: Walls and Mirrors, second edition*, Addison Wesley, 2006.
Notes on Web – (on nTreePoint course web page).