COMP 3170 - Analysis of Algorithms and Data Structures

Calendar Description: Fundamental Algorithms for sorting, searching, storage management, graphs, databases and computational geometry. Correctness and Analysis of those Algorithms using specific data structures. An introduction to lower bounds and intractability.

Prerequisites: COMP 2080 and COMP 2140.

This course is a prerequisite for: COMP 4340 and COMP 4420

Outline

1) Algorithms (Review) (3 weeks)
   Worst Case and Average Case, Review Big Oh notation, Master Theorem, Divide and Conquer, Dynamic Programming (0-1 Knapsack), Principal of Optimality, Greedy Algorithms

4) Data Structures (3 weeks)
   Arrays, Stacks, Queues, Lists, Graphs, Trees, Tables, Heaps and Binomial Heaps, Amortized Analysis

5) Backtracking Algorithms (3 weeks)
   Branch & Bound, 8 Queens Problem, 0-1 Knapsack, Travelling Salesman Problem, Assignment Problem

6) Complexity Theory (3 weeks)
   Lower Bounds & Adversary Arguments, 13 coins problem, Decision Problems, NP NP-complete, Polynomial Reduction & Satisfiability Problem, Other complexity classes, Approximation Algorithms

7) Randomized Algorithms (1 week)
   Monte Carlo, Las Vegas, Other