Computing Science Course Outlines

CMPT 307 - D200 Data Structures and Algorithms

Instructor(s): Joseph Peters

Calendar Objective/Description:
Analysis and design of data structures for lists, sets, trees, dictionaries, and priority queues. A selection of topics chosen from sorting, memory management, graphs and graph algorithms.

Instructor's Objectives:
The objective of this course is to introduce concepts and problem-solving techniques that are used in the design and analysis of efficient algorithms. This is done by studying various algorithms, algorithmic techniques, and data structures.

Prerequisites:
CMPT 225, MACM 201, MATH 151 (or MATH 150), and MATH 232 or 240.

Topics:
- Introduction and Mathematical Preliminaries (Review): Models of Computation, Big-O Analysis
- Searching and Sorting: Divide & Conquer Paradigm, Analysis of Recurrences, Master Method
- Sorting and Order Statistics: Heapsort, Quicksort, Non-comparison sorts, Lower bounds, Median
- Randomized algorithms, Average case analysis
- Simple Data Structures: Lists, Stacks, Queues, Trees
- Dictionaries and Priority Queues: (Balanced) Binary search trees, Heaps
- Graphs: Representations, Path Searching, Spanning Trees
- Amortized Analysis: Aggregate, Accounting, Potential Methods
- Optimization Problems: Dynamic programming, Greedy algorithms
- NP-Completeness

Grading:
The course has a final examination, homework assignments, and quizzes or midterms. The grade distribution will be announced during the first week of classes.
Students must attain an overall passing grade on the weighted average of exams in the course in order to obtain a clear pass (C- or better).

Required Books:

Reference Books:
Algorithm Design, J. Kleinberg, E. Tardos, Addison-Wesley, 2006, 9780321295354

Academic Honesty Statement::
Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies (http://www.sfu.ca/policies/gazette/student.html).