Computing Science Course Outlines 2018 Fall

CMPT 307 - D200 Data Structures and Algorithms

Instructor(s): Joseph Peters

SFU Surrey

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:
- Algorithms with Numbers: Asymptotics, Arithmetic, Cryptography, Hashing, Randomization
- Divide-and-Conquer: Recurrences, Sorting, Selection, Lower bounds, Fast Fourier Transform
- Graphs: Graph Searches and Applications, Trees, Shortest paths, Priority queues and heaps
- Greedy Algorithms: Spanning trees, Disjoint sets, Amortized analysis, Huffman encoding
- Dynamic Programming: Shortest paths, Longest subsequences, Edit distance, Sequence alignment
- Introduction to NP-Completeness: Reductions, Approximation algorithms

Grading:
Assignments, Midterm Examination, Final Examination. The grade distribution will be discussed during the first week of classes.

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 ).