Computing Science Course Outlines  
2020 Spring

CMPT 307 - D100 Data Structures and Algorithms

Instructor(s): Qianping Gu

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 for the design and analysis of efficient algorithms through studying data structures, algorithms, and algorithmic techniques.

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

Topics:
- Introduction 1: algorithm design and analysis examples, computation models, Big-O analysis
- Introduction 2: divide and conquer, analysis of recurrence, randomized algorithms
- Sorting and order statistics: Heapsort, Quicksort, other sorting problems
- Simple data structures: lists, stacks, queues, trees, hash tables
- Algorithm design and analysis techniques, dynamic programming, greedy, amortized analysis
- Advanced data structures, B-trees, Fibonacci heaps
- Graph algorithms, graph search, minimum spanning trees, shortest paths
- Selected topics, NP-completeness, string matching, maximum flow

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 ).