CMPT 307 - D200 Data Structures and Algorithms

**Instructor(s):** Kay C Wiese

**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, data structures, and applications.

**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
- Linear Programming

**Grading:**
The course grade will be based on a midterm exam and final examination. There will be some graded assignments as well. The exact grade distribution will be announced during the first week of classes in a detailed course outline.

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).