CSC222 **Spring 2014**
Data Structures & Algorithms II

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Office Hours: Monday, Wednesday, Friday 2:00 to 4:00 and by appointment.

Text: Algorithms by S. Dasgupta, C. Papadimitriou, and U. Vazirani

Web Page: http://menehune.opt.wfu.edu/csc222

Goals and Topics:

1. Analysis of algorithms, asymptotic complexity measures
2. Algorithm design strategies: common ideas used in a variety of algorithms
   (a) Divide and conquer / Balancing
   (b) Backtracking
   (c) Greedy algorithms
   (d) Dynamic Programming
   (e) Randomized algorithms: Monte Carlo & Las Vegas
3. Review of Data Structures – as needed
4. Review of Recursion – as needed
5. Problem solving and programming skill
6. Parallel Algorithms and their implementation
   (a) Amdahl and Gustafson's law
   (b) OpenMP programming (shared memory)
   (c) Parallel asymptotic measures (speedup, efficiency, iso-efficiency)
7. Commonly used algorithms for important problems.
   (a) RSA encryption
   (b) Finding k^{th} largest element of a set
   (c) Graph Algorithms, depth-first search, depth-first spanning tree, classifying edges (tree, back, cross), strongly connected components, topological sort, minimal spanning tree, single source shortest paths, all-points shortest path,
   (d) The Fast Fourier Transform and the convolution theorem
   (e) Matrix multiplication (Strassen's algorithm)
   (f) Numerical algorithms: Newton's method
8. The Classes $\mathcal{P}$ and $\mathcal{NP}$, $\mathcal{NP}$-complete problems
9. Correctness proofs and proof by induction
10. Proficiency in using Unix/Linux (Ubuntu), the Unix development environment(s), vi, emacs, g++, make, gdb, etc.
11. GUI programming using call-backs (if time).

Expectations:

1. Class participation.
2. Communicate if things get complicated.
3. Your best effort.

Grading:
Three exams (70%), programming assignments and take home problem sets (30%). Programming assignment(s) **must** be submitted ready to compile and run under Linux.

Disability Notice:
If you have a disability that may require an accommodation for taking this course, then please contact the Learning Assistance Center (758-5929) within the first two weeks of the semester.

Pandemic Planning Notice:
The University has requested that faculty collect personal contact information as part of emergency planning and preparation. The information you provide is strictly confidential.