CSC221 Spring 2012
Data Structures & Algorithms I

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

Text: Fundamentals of Data Structures in C++ by Ellis Horowitz, Sartaj Sahni, Dinesh Mehta

Facilities: Ubuntu Linux with Virtual Box. Undergraduate Computing Lab. Backup systems tristan and isolde.

Goals:

1. Review of Linear Data Structures
   (a) Linked lists, variants, doubly linked lists
   (b) Stacks: array-based implementation vs linked implementation
   (c) Queues: circular array implementation vs linked implementation
   (d) Operations on linear data structures: search, insert, delete, list traversal
   (e) Application: boundary tag and buddy system memory management
2. Trees
   (a) Binary search trees
   (b) Height balanced (AVL) trees
   (c) Heaps
   (d) B-Trees
   (e) Operations on trees: search, insert, delete, tree traversals
3. Hash tables
   (a) Modular arithmetic and hash functions
   (b) Chaining
   (c) Open addressing
      i. Clustering, pseudo-random probing, and double hashing
   (d) Operations on hash tables: search, insert, delete
4. Sets: efficient implementation of set operations
5. Analysis of algorithms, asymptotic complexity measures
6. Efficient sorting methods
   (a) Mergesort
   (b) Quicksort
   (c) Heapsort
7. Finding k^{th} largest element of a set

8. Proficiency in using Solaris/Linux/Unix, the Unix development environment(s), vi, emacs, CC, make, gdb, dbx, etc.
9. Advanced C++ Topics (as time allows)
   (a) Pointer coercion
   (b) Standard template library
   (c) Template functions and template classes
   (d) Inheritance
   (e) Virtual functions, virtual base classes
10. GUI programming using callbacks (if time allows).

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 or Solaris.

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.