COSC2430: Programming and Data Structures

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1 Course information

Lecture and lab: as posted on the University Peoplesoft System
TA hours: posted on my web page
Newsgroup: Google newsgroup answered 24/7, instructions posted on TA web page
email: Start subject with "COSC2430-" (personal issues, or if TAs failed to answer question).

2 Course contents

This is an introductory level course on data structures and algorithms, as well as how to program them in C++. This course assumes basic computer science knowledge, programming experience with the C++ or Java languages and basic background on mathematics. The textbook is [2], complemented by [1]. Any CS book on C++ (I recommend Stroustroup's textbook on C++) and discrete mathematics are helpful for additional reference.

Topics include the following. Basics of C++ and OOP: pointers, encapsulation, abstract data types, inheritance, methods, overloading. Fundamentals of programming: proving program correctness, evaluating program speed; testing, debugging, extending C++ code. Fundamental data structures: lists, queues, stacks, trees, heaps, hash tables. Sorting and search algorithms: selection, heap, quick, shell, merge sort; linear, binary, tree-based, hash-based search. Graphs: storage, search, traversal, shortest path, connectivity, NP-completeness. Theory: recursion, time complexity analysis, algorithm design techniques.

3 Grading

- 70%: 4 programming assigments.

  HW weights are as follows: HW1=10%, HW2=20%, HW3=20%, HW4=20%. HWs 2,3,4 are submitted in 2 phases with 10% weight each, with easier and harder test cases. Resubmissions are not accepted. Phase 2 is an opportunity to fix errors from Phase 1.

- 30%: Midterm during October.

Programming assisgnments are a fundamental component of learning for this course. All programming homeworks must be turned in to get C. Programs will be developed in C++ and tested with the GNU C++ compiler; using other C++ compilers is feasible to get started, but discouraged. Programming assignments are individual. Some test cases and test scripts will be posted together with each HW, but the programs will be tested with different test cases. Programs are thoroughly tested by the TAs, and graded on a [0-100] scale: A non-submitted program grade is ZERO, a non-working program (i.e. compiles, but does not run) grade is 10, while a program with many errors reaches 50. Only fully functional programs can be expected to receive 80 or higher.

The midterm exam can be multiple choice or short answer; either one will thoroughly test theoretical and C++ programming knowledge.

References

[1] A. Aho, J.E. Hopcroft, and J.D. Ullman. *Data Structures and Algorithms*. Addison/Wesley, Redwood City,California, 2nd edition, 1983.

[2] D.S. Malik. *Data Structures Using C++*. Course Technology, 2nd edition, 2010.