

COSC2430: Programming and Data Structures

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1 Course information

Available at official course webpage: <http://www2.cs.uh.edu/~arjun/courses/ds/>

2 Learning Objectives and Course Contents

This is an introductory level course on data structures and algorithms, as well as how to program them in Java. This course assumes basic computer science knowledge, programming experience with the C/C++ or Java languages and basic background on mathematics. The textbook is [1]. Any good book on Java stressing OOP and good programming constructs (I recommend Head First Java) and discrete mathematics are helpful for additional reference.

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

3 Assignments and Grading

- 75%: 5 programming assignments each with a 15% weight.
- 30%: Exam 1
- 10%: Classwork/Lab attendance and working out assignments in class.
- 5%: Lecture attendance

Programming assignments are a fundamental component of learning for this course. All programming homeworks must be turned in and the student is required to obtain the passing score in Exam 1 for passing the course. All components add to 120%, however students will be evaluated on 100% allowing some leeway to account for the student to makeup if the performance declines. Programs will be evaluated in the Linux environment. Programming assignments are individual. Some examples input and output 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, or produced incorrect output) will be dealt on a case by case basis and may be eligible for partial credits.

References

- [1] Goodrich, M. T., Tamassia, R., Goldwasser, M. H. *Data Structures and Algorithms in Java*. Wiley, 6th edition, 2016.