CSCE 221H: Data Structures and Algorithms
Fall 2018

Lecture Place/Time: HRBB 126 / TR 2:20pm-3:35pm
Lab Place/Time: ZACH 445 / MW 4:10pm-5:00pm

Instructor: Dr. Scott Schaefer
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Course Web Page: http://faculty.cs.tamu.edu/schaefer/teaching/221_Fall2018

Course Description: Specification, analysis, and implementation of abstract data types for lists, stacks, queues, trees, hash tables, graphs, and their associated algorithms. Performance trade-offs of different implementations; asymptotic analysis of running time and memory usage. Includes the execution of student programs written in C++; emphasis on adherence to good software engineering principles.

Prerequisites:

- CSCE 121 "Introduction to Program Design and Concepts" or
  ENGR 112 "Foundations of Engineering" and CSCE 113 "Intermediate Programming & Design"

- CSCE 222 "Discrete Structures" or
  MATH 302 "Discrete Mathematics" (either may be taken concurrently with CSCE 221)

Required Textbook:
"Data Structures and Algorithms in C++" by M. T. Goodrich, R. Tamassia, and D. Mount, second edition 2011, John Wiley & Sons, Inc., ISBN 13-978-0-470-38327-8. You may any good C++ reference book helpful as well.

Learning Objectives:

1. Provide student with knowledge of basic abstract data types and associated algorithms: stacks, queues, lists, tree, graphs, hashing and sorting, selection and searching.
2. Provide students with practice by specifying and implementing these data structures and algorithms in C++.
3. Provide students with skills needed to understand an analyze performance trade-offs of different algorithms/implementations and asymptotic analysis of their running time and memory usage.

Expected Learning Outcomes:
At the end of this course, students should be able to

1. Design and implement different data structures that allow easy access and manipulation of data using the C++ programming language.
2. Apply the Big-O asymptotic notation to analyze and select efficient algorithms for solving a given problem with respect to time and memory usage.

Course Content:

Introduction / Analysis of Algorithms	Chapter 4
Stacks, Queues, and Deques	Chapter 5
Vectors, Lists, and Sequences	Chapter 6
Trees	Chapter 7
Priority Queues & Heaps	Chapter 8
Maps, Dictionaries, Hashing	Chapter 9
SkipLists	Chapter 9
Binary Search Trees	Chapter 10
Sorting and Selection	Chapter 11
Graphs	Chapter 13

Grading:

The overall grade will be determined as follows:

Labs:	3%
Homework:	12%
Culture Assignments:	5%
Programming Assignments:	30%
Quizzes:	10%
Midterm:	20%
Final:	20%

The expected grading scale will be A >= 90% > B >=80% > C >= 70% > D >= 60% > F. Depending on the final percentage distribution, an absolute or relative curve may be applied, though an attempt will be made to avoid this situation. In addition, the instructor reserves the right to raise grades near a "borderline" to the next highest letter grade. Factors weighing into this decision will be the individual student's perceived effort and class attendance/participation.

All programs must be written in C++, compiled and run on a CS departmental computer (Visual Studio on Windows), and turned in via the CSNet turnin program. Each homework assignment will be graded focusing on: algorithm design, usage of data structures and/or new user-defined types and their implementation, its correctness, tests, a typed report describing implemented algorithms and data structures, and results of computational experiments.

Computer Science Account:

To claim your Computer Science account in order to use any of the CS computing resources, which includes the labs, UNIX, printing, email, and web resources. See the Getting Started Guide https://wiki.cse.tamu.edu/index.php/Getting_Started_Guide

Polices:

Attendance: Attendance will not be checked, however it will be considered in borderline decisions for the final grade. Students with unexcused absences should not expect additional help outside of class and are still responsible for any material or instructions given in class, for turning in assignments on time, and for taking exams at the scheduled times. Make-up assignments will not be given unless there is a highly unusual circumstance. Attendance is strongly suggested as there is a high correlation with final grades. Moreover, quizzes will only be given in class or in lab and students must be present in order to take the quiz.

Late Assignments: Assignments are due at 11:59pm on the given due date. Assignments turned in after that time will be considered late. The **percentage penalty** applied to each late assignment will be calculated as follows: let *m* be the number of minutes late, the percentage penalty is *m*/57.6. Therefore, an

assignment 24 hours late will receive 25% off of the grade assigned without any penalty, and an assignment 4 days late will receive no credit. Certain assignments may not be allowed to be turned in late.

Communication: A class web page (listed at the top of this syllabus) will be maintained throughout the semester. Students are responsible for checking both the web page and email regularly for class updates.
Reading: Readings from the required textbook will be given out throughout the semester. We will not be able to discuss all of it in class, but you are still responsible for keeping up with these readings.

Code Documentation: When assignments are graded, source code may be examined to verify the way a solution was achieved or to award partial credit. It is *your* responsibility to make sure that your source code is presented in a clear, readable, way. Even if your code "works," if the grader can't understand it, you may lose points.

Academic Honesty:
The Aggie Honor Code is: "An Aggie does not lie, cheat, or steal or tolerate those who do." Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Ignorance of the rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/

For this class, the interpretation of the code will be as follows: Unless specifically stated otherwise, all assignments are to be done **on your own**. You may discuss general concepts, and get help in tracking down a persistent bug, but should not copy work, download code from the web or other sources, or work together with other students on problems or programs unless specifically stated otherwise. If you use sources other than the textbook or lecture notes, list them in a homework Cover page. You **must** write up your assignments **in your own words**. Copying is strictly forbidden. By turning in an assignment or exam, you are implicitly assumed to be committing to the honor code. **If you are unsure of whether a type of cooperation is appropriate, check with the instructor or TA first.** That is, you should err on the side of assuming cooperation is *not* allowed. If, in the opinion of the instructor, any homework shows evidence of copying, the student(s) will receive at *minimum* a zero on the assignment and be placed on honor council probation. The penalty could escalate to expulsion from the university.

ADA Statement:
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities, in Cain Hall or call 845-1637.