CSCI 335 – Software Design and Analysis III

Instructor: Justin Tojeira Semester: Spring 2025

Text: *Data Structures and Algorithm Analysis in C++*, 4th edition, Mark Allen Weiss.

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Course Description:
We'll study the design, analysis, implementation, and uses of a variety of data structures and algorithms. Entering this course, you are assumed to be proficient with linear data structures (including lists, stacks, and queues) and should be able to implement them as vectors and/or arrays in C++.
You should also be able to write and use classes in C++, and write well-organized code in accordance with OOP principles.
Data structures we'll cover this semester include self-balancing trees, hash maps, heaps, sets, and graphs. We will focus on algorithmic analysis and use of the C++ STL to efficiently solve programming problems. All code should be as efficient and memory-safe as reasonably possible in C++, and should adhere to professional C++ best practices.

Learning Outcomes:
- Demonstrate the basic operations of the data structures we cover.
- Prove the computational complexities of basic operations of the data structures we cover.
- Relate the data structures we study to C++ STL containers.
- Write professional, efficient, memory-safe code using the C++ STL.
- Analyze the computational complexity of algorithms and code samples.
- Design and implement efficient solutions to programming problems.
- Explain trade-offs between different algorithmic solutions.

Grading:
Your final grade will be weighted as follows:
- Exams: 60 points
- Homework and programming assignments: 40 points

In order to receive any passing grade (including a D), in addition to the overall average requirements, you must earn at least 30 out of 60 points on exams and 20 out of 40 points on homework and programming assignments.
Constructive and regular class participation may earn you up to 4 points of extra credit.

Exams:
Two midterms and a final exam are planned. Each exam has a maximum score of 100 points. Your weighted exam average, which makes up 60 points of your final grade, will be the greater of:
- 60% of the average of all 3 exams.
- 35% of the final exam plus 25% of your higher midterm exam.

No make-up exams will be given, as it is not possible to ensure fair make-up exams in a class of this size and difficulty. If you miss an exam, you will simply default to the second grading option.

Homework and Programming Assignments:
This is a software analysis and design course, not a “tech project” course. As such, the focus is on code and algorithms, and you are expected to write all of your own code and be able to explain every line of code you turn in on any homework or assignment. Thus:

- You are not permitted to share your code with other students. If you use GitHub or any other repository while you work on your projects, make sure all class projects are kept private until a month after the class ends.
- You are not permitted to post homework or assignments from this course to any forum (Stack Overflow, Chegg, Course Hero, GeeksforGeeks, etc), or to otherwise solicit solutions.
- You are not permitted to use any generative AI to write code or any other answers for you.
- Design, analysis, and implementation are the cornerstones of this course. If you don't try to design both the algorithm and code yourself before looking up an answer, you will not learn what you will need in order to pass the exams.

Homework and programming assignments will be submitted on Gradescope. Programming assignments will be graded using the autograder and/or manual grading. Homework assignments will be graded based on discernible effort and completion, rather than correctness.

Efficiency, Memory Safety, and Best Practices:
On all exams, assignments, and homework, unless otherwise stated, your answer must be efficient and adhere to current best practices using the C++ STL. An inefficient approach or code that does not use the STL effectively may get partial credit or no credit.

Class Attendance:
This is an in-person class. Class attendance is mandatory, and anything discussed in class is fair game for exams. Announcements regarding class material, scheduling, and policies may be made in class and/or on Brightspace. I will try to make important announcements in both places, but any announcement made in either will be considered part of the class record.

Updating of syllabus:
This syllabus is a guide for the course and is subject to change if the need arises. Any adjustment to the material, schedule, or grading policy will be posted on Brightspace along with the updated syllabus.

Additional Contact Information:
Computer Science Department: North 1008 (10th floor North Building), 212-772-5213

Hunter College Official Policies:

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College reaffirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationships. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.
a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College's Public Safety Office (212-772-4444).
b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry

(colleen.barry@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.
CUNY Policy on Sexual Misconduct Link: https://www1.cuny.edu/sites/title-ix/campus/university/

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Bullying, cyberbullying, online hate, intimidation, threats, harassment, and pressure to share schoolwork are all forms of violence. CUNY holds a zero tolerance stance towards all such acts. The University is committed to prevention of any form of bullying, will respond promptly to threats and/or acts, and will protect victims of bullying from retaliation. As a criminal matter, the New York Attorney General defines cyberbullying as the use of email, websites, instant messaging, chat rooms, text messaging and digital cameras to antagonize and intimidate others. Disrupting a teleconferencing platform (such as Zoom/Skype/Blackboard Collaborate Ultra) is a federal crime.