HUNTER
The City University of New York

Software Design and Analysis III

CSCI 335 Fall 2022

Instructor: Anita Raja, Ph.D., Professor of Computer Science
Office: HN 1090G
Email: anita.raja@hunter.cuny.edu **URL:** https://anraja.commons.gc.cuny.edu/
Office hours: Mondays 11:00-12:00pm, Thursdays 12:00-1:00pm or by appointment

Course Meeting Time: Monday/Thursday 2:30pm-3:45pm
Meeting Location: HW 714
Course Credits: 3
Pre-requisites: CSCI 235, MATH 155 or permission of instructor.
Course webpage: Blackboard; visit it regularly

Textbook:

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

Optional books: (not required, but useful)

- Cormen, Leiserson, and Rivest, Introduction to Algorithms, McGraw-Hill (comprehensive and advanced).
- Knuth, The Art of Computer Programming, Volumes I through III, Adison-Wesley (valuable texts for computer scientists).
- Algorithms in C++, Parts 1—4 and Part 5, Robert Sedgewick, Addison-Wesley (in depth algorithm analysis).

Modern C++ techniques

- Effective Modern C++: 42 Specific Ways to Improve Your Use of C++11 and C++14, Scott Meyers

Catalog Description and Topics:

The design and analysis of various types of algorithms, including searching, sorting, graph and tree algorithms. Problem-solving techniques. Worst and average case behavior analysis and optimality. Polynomial time complexity classes and theory, including NP-completeness.This course is the sequel to CSCI 235, and as such, a major objective is to

deepen and enhance your programming skills as well as knowledge of various advanced algorithms. The course will cover Algorithm Analysis, Advanced Trees, Special Priority Queues, Sorting Algorithms, Disjoint Sets, Graph Algorithms, Dynamic Programming, Randomized Algorithms, and Amortized Analysis.

Course Credits:

3 units: This 3-credit course requires 3 hours of classroom or direct faculty instruction and on average 2-6 hours of out-of-class student work each week for approximately 15 weeks. Out-of-class work may include but is not limited to: Required Reading, Coding assignments, Written assignments, and studying for quizzes and exams.

Learning Goals:

This class satisfies the following learning goals:

(1a): Demonstrate an understanding of the basic foundations and relevant applications of mathematics and statistics, particularly those branches related to computer science.

(1b): Demonstrate an understanding of the overarching relationships between hardware and software, i.e. computer architectures, software systems and operating systems.

(2a): Be proficient in writing and reading programs sufficient to implement and study algorithms.

(2b): Be able to apply principles of design and analysis in creating substantive projects involving programs and algorithmic design,

(3a): Be able to communicate technical ideas effectively, both in writing and in oral presentations.

How to Succeed in this Course?

Plan on doing *all* of the following:

- Do the assigned readings *before* the lecture, *not after* it.
- Make a list of questions before the class.
- Submit all assignments on time.
- Solve a set of problems at the end of each chapter.
- Study for exams.
- Adhere to assignment requirements and the College's Academic Integrity policy.

Syllabus and Readings:

The topics covered and tentative schedule are listed in the schedule document in the course blackboard page. You are responsible for everything in the listed chapters regardless of how much time we spend on them in class. As noted above, you should read ahead so that you can ask questions in class to clear up anything you find confusing.

Assignments

Every program assignment submission must satisfy the programming rules stated in the *Programming Rules* document posted on Blackboard. You are required to read this document. The rules governing submission via gradescope, lateness, plagiarism, and how they are graded are also described in this document. Although Gradescope allows multiple submissions, **it is not a platform for testing and/ or debugging and it should not be used for that. You MUST test and debug your program on your local machine**. **You**

MUST also ensure that your program compiles (with g++) and runs correctly on one of the Linux machines in 1001B lab at Hunter North.

Assignments are individual submissions. You may discuss the assignments but the solution and code must be your own. Sharing and/or receiving solutions is not allowed. It is imperative that all submitted program listings and executions be thoroughly documented. You are allowed to use the source code that is provided by the book. Acknowledge all code that you use from the textbook.

All programs must compile and run. Zero credit will be given for programs that do not compile or do not run when graded. Usually the homework assignments will only state the major objectives of the program to be written; it will be often up to you to make design decisions regarding I/O, efficiency, error handling, and so on. Make sure you test the code adequately to indicate the correctness and robustness of your approaches.

Each assignment will be assigned in Blackboard along with submission instructions. The course is designed to be **self-contained**. Thus, **the only resources you need to answer the questions are contained within the course**. Searching the web (e.g., Google) for answers is not only *unnecessary* but also risks academic violations, which can result in course failure.

Participation

Every student is expected to present themselves in a professional manner. Students with questions or who wish to participate during the lecture are encouraged to raise their hands during class. There will be exercises and interactive polls during class that will account for part of the participation grade. There will also be opportunities for extra credit that will be clearly announced.

Attendance

The instructor will start the class on time, and students are expected to be present on time.

Course Material

All course material (i.e. slides or other sources) will be uploaded on *blackboard*. Homework assignments will be uploaded on *blackboard*. We will also use *the blackboard email and discussion board* for communication.

If you have a question about the class, topics covered, homework, etc. please first check the posts in the Q & A section. If you did not find an answer, please post your question there. That will make it easier for all students to see answers. Course staff including UTAs will be regularly checking the board and posting answers. You can also answer questions of fellow students. Do not post any code solutions. For questions involving personal matters you can email me – please make sure your subject line in your emails to me should begin with "CSCI 335: <topic>". Office hours (in-person and remote) will be maintained

by course staff including the instructor and UTAs. Information about hours and location will provided during the first week of classes and posted on the blackboard.

Tutoring will also be available at Skirball Science Learning Center.

The standards and requirements set forth in this syllabus serve as the course policy. Notice of any modifications/changes to the syllabus will be by announcement in class or by changes to this syllabus posted on the course website along with the change date.

Talk to me if there are questions or concerns about the course. I also welcome feedback on the course progress throughout the semester.

Course Grading Rubric

There will be one midterm exam and one final exam. The final exam is not comprehensive (i.e. it will only cover material taught after the midterm). Your final grade will be calculated as follows:

Participation and In-class Exercises	7%
Assignments (5; lowest grade dropped)	48%
Midterm Exam	20%
Final Exam	25%

Key Dates

See **Course Schedule** document on blackboard.

Make-up Policy

All exams must be taken on time. Failure to take an exam counts as a zero grade on that exam. There will be no make-up exams. In case you must miss an exam or a homework for a valid medical/family emergency, your exam grade composition will be adjusted. In case of such a documented emergency, contact me as soon as possible **before the exam time** and get a confirmation from me with a plan to discuss the exam grade adjustment.

Special Needs

Students with special needs should contact me for accommodation *at least* two weeks prior to the due date of any assignment or exam.

Academic Integrity

CUNY 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. Special attention is given to **CONTRACT CHEATING** (this is where students have work completed on their behalf which is then submitted for academic credit). Academic violations will be reported and adjudicated by the Office of Student Conduct. They pursue

consequences to the fullest extent possible, including failure from the course. More details in the programming rules document on the blackboard.

ADA Compliance

In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and / or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical and / or Learning) consult the Office of Accessibility located in Room E1124 to secure necessary academic accommodations. For further information and assistance please call (212-772-4857)/TTY (212-650-3230).

CUNY New York Workplace Policy and Procedures

The City University of New York has a longstanding commitment to promoting a safe and secure academic and work environment that promotes the achievement of its mission of teaching, research, scholarship and service. All members of the university community students, faculty and staff are expected to maintain a working and learning environment free from violence, threats of harassment, violence, intimidation or coercion. In addition, while using Hunter facilities all individuals must follow the Henderson Rules. Hunter does not tolerate actions or threat of action, that put our campus community members at risk. 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. https://www.hunter.cuny.edu/diversityandcompliance/workplace-violence and Hunter College WPV training.

Hunter College Policy on Sexual Misconduct

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:
http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf

Thank you for abiding by these policies. Doing so will ensure the experience is a productive and fair experience to everyone taking this class and/or the future offerings of this course.

Resources

- Blackboard page titled Course Information.
- Source code from the book can be found at: http://users.cs.fiu.edu/~weiss/
- C++ STL:
  - http://www.martinbroadhurst.com/stl/
  - http://www.cppreference.com/wiki/stl/start
  - http://www.yolinuxcom/TUTORIALS/LinuxTutorialC++STL.html

- C++ STL exceptions:
  - http://www.cplusplus.com/doc/tutorial/exceptions/

- Source code documentation generating tool (Doxygen):
  - http://www.doxygen.nl/

Acknowledgements:
Materials for this course were adapted from materials provided by Mark Weiss' textbook and website, Prof. Stamos and other Hunter Computer Science resources.