HUNTER
The City University of New York

Software Design and Analysis III

CSCI 335 Syllabus (Final draft as of Jan 30, 2021)
Spring 2021

Tuesday/Friday 2:10PM - 3:25PM, Online/synchronous

Instructor:	Dr. Sven Dietrich, Professor of Computer Science spock@hunter.cuny.edu, http://www.cs.hunter.cuny.edu/~spock
WWW:	Course-related material can be found on **Blackboard** Visit it regularly. Online lectures will take place on Blackboard.
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Office Hours:	Fridays 11am -1pm (via online meetings)
Student assistants (UTAs):	• Blake Vente (Ralph.Vente09@myhunter.cuny.edu) • John Zhen (John.Zhen24@myhunter.cuny.edu) • Parakram Basnet (parakram.basnet85@myhunter.cuny.edu)

Textbook

Required: Mark Allen Weiss, *Data Structures and Algorithm Analysis in C++,* 4th Edition, Pearson Education, 2014. ISBN-13: 978-0-13-284737-7.

Other books: (not required, but useful)

Data Structures & Algorithms

• Cormen, Thomas H.; Leiserson, Charles E.; Rivest, Ronald L.; Stein, Clifford (2009). Introduction to Algorithms (3rd ed.). MIT Press and McGraw-Hill. ISBN 0-262-03384-4. 1320 pp. (comprehensive and advanced).
• Knuth, Donald. The Art of Computer Programming, Volumes I through III, Addison-Wesley (valuable texts for computer scientists).
• Robert Sedgewick , Algorithms in C++, Parts 1—4 and Part 5, Addison-Wesley (in depth algorithm analysis).

Modern C++ techniques

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

Course Content and Objectives

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. While it is a sequel to CSCI 235, it is one of the **more challenging courses in Computer Science, unlike the programming courses you have taken thus far**. The course will cover Algorithm Analysis, Advanced Trees, Special Priority Queues, Sorting Algorithms, Disjoint Sets, Graph Algorithms, Dynamic Programming, Randomized Algorithms, and Amortized Analysis.

Prerequisites

CSCI 235 and MATH 155.

Not Repeating This Course

If you do not want to repeat this course then you'd better do *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.
- Do all assignments yourself! Various plagiarism checkers will be used. Expect severe penalties for plagiarism.

Syllabus and Readings

At the end of this document you can see which parts of the textbook we will cover. 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

No one can become proficient at programming without writing many programs, but one must also communicate results. There will be five programming assignments during the semester, and one presentation assignment to fulfill the oral presentation goals.

Every program must satisfy the programming rules stated in the *Programming Rules* (posted on Blackboard) document. The rules governing lateness, plagiarism, and how they are graded are also contained there. You are not allowed to work in groups. You can discuss the assignments. However, copying of pieces of code among peers is a serious transgression. It is critically important that all submitted program listings and executions be thoroughly documented.

Each assignment will count for 10% of your final grade. That means that the six assignments will constitute 60% of your final grade. You are allowed to use the source code that is provided by the book.

All programs must compile and run. Zero credit will be given for programs that do not compile or do not run. 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 provide adequate test cases to indicate the correctness and robustness of your approaches.

Course Material and Communication

All course material (i.e. slides or other resources) will be uploaded on *Blackboard*. Homework assignments will be uploaded on *Blackboard*. Note the supported browsers: http://www.hunter.cuny.edu/provost/repository/files/Hunter%20College%20Syllabus%20Checklist_Aug2020%20-1.pdf

If you have a question about the class, topics covered, homework, etc. please first check the posts in the Q & A or discussion board section. If you did not find an answer, please post your question there. That will make it easier for all students to see answers. You can also answer questions of fellow students. Do not post any code solutions. For questions involving personal matters you can email the instructor. All email communication is to use CUNY email only. Please make sure you add "CSCI 335" to the subject of your emails.

Grading

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

60% (6 assignments) + 15% (midterm) + 25% (final)

Make-up Policy

All exams must be taken on time. Failure to take an exam counts as a zero grade on that exam. If you miss the midterm or final exam for a legitimate, documented medical emergency, the instructor will find a way (if possible) to assist you.

Lecture Recording Policy

Students are **not allowed** to record the online lecture using screen, audio, or video recording. Lecture notes/slides will be made available to the students to get access to the lecture materials.

Resources

Source code from the book can be found at: http://users.cs.fiu.edu/~weiss/

C++ STL:
http://www.sgi.com/tech/stl/
http://www.cppreference.com/wiki/stl/start
http://www.yolinux.com/TUTORIALS/LinuxTutorialC++STL.html

C++ STL exceptions:
http://www.aoc.nrao.edu/~tjuerges/ALMA/STL/html/classstd_1_1exception.html

Source code documentation generating tool (Doxygen):
http://www.stack.nl/~dimitri/doxygen/

Learning goals

This class satisfies the following learning goals:
(2a): Deep practical knowledge of one widely used programming language (C++).
(2b): Be experienced in working in at least two widely used operating system environments.
(2c): Be able to apply principles of design and analysis in creating substantial programs.
(1b): Understand the relationship between computer architectures and software systems.
(3a): Be able to communicate technical ideas effectively, both in writing and in oral presentations.

Academic Integrity

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. You can find a copy of this policy online, and by being a CUNY student you are held by it. Please take a moment to read it, if you have not done so already:

https://www.cuny.edu/about/administration/offices/legal-affairs/policies-procedures/academic-integrity-policy/

Proctoring Software

Proctoring software, which may include the use of browser lock-downs and cameras, may be used for examinations in this course.

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 AccessABILITY located in Room E1124 to secure necessary academic accommodations. For further information and assistance please call (212-772-4857)/TTY (212-650-3230).

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

Hunter College Counseling and Wellness Services

Students should take care of themselves during the semester. In case of concern, students should know that their peers and themselves can find a complete range of counseling and referral services at the Hunter Counseling & Wellness Services:

personalcounseling@hunter.cuny.edu
Tel: 212.772.4931
Room 1119, East Building
http://www.hunter.cuny.edu/cws

	CSCI 335 -- SYLLABUS & TENTATIVE SCHEDULE (Spring 2021)		
Date	**Topics**	**Readings**	**Deadlines**
Fr, Jan 29	L1. Introduction – C++ basics	Chapter 1	
Tu, Feb 2	L2. -//-	-//-	
Fr, Feb 5	L3. Algorithm Analysis	Chapter 2	
Tu, Feb 9	L4. Review of Vector/List and Iterators	Chapter 3	
Fr, Feb 12	**NO CLASS – COLLEGE CLOSED**		
Tu, Feb 16	L5. Review (continue)		HW#1 due
Fr, Feb 19	L6. Trees (AVL)	4.1-4.3	
Tu, Feb 23	L7. Trees (cont)		HW#2 due
Fr, Feb 26	L8. Trees (Splay Trees, B-Trees)	4.5, 4.6-4.7	
Tu, Mar 2	L9. Sets/Maps	4.8	
Fr, Mar 5	L10. Hashing	Chapter 5	
Tu, Mar 9	L11. -//-		
Fr, Mar 12	L12. Catch up		HW#3 due
Tu, Mar 16	**MIDTERM**		
Fr, Mar 19	L13. Heaps	Chapter 6	
Tu, Mar 23	L14. Heaps	-//-	
Fr, Mar 26	L15. Sorting	7.1-7.7	
Tu-Th, Mar 27-Apr 4	**NO CLASS – SPRING BREAK**		
Tu, Apr 6	L16. Sorting	7.8-7.9	
Fr, Apr 9	L17. Union/Find	Chapter 8	HW#4 due
Tu, Apr 13	L18. Graph Algorithms	9.1-9.3	
Fr, Apr 16	L19. -//-	9.4-9.6	
Tu, Apr 20	L18. -//- (NP)	9.7	
Fr, Apr 23	L20. Greedy Algorithms	10.1.1, 10.1.3	
Tu, Apr 27	L19. Divide and Conquer	10.2	HW#5 due
Fr, Apr 30	L21. Divide and Conquer (cont)		
Tu, May 4	L22. Dynamic Programming	10.3	
Fr, May 7	L23. -//-		
Tu, May 11	L24. Randomized Algorithms (time permitting)	10.4	HW#6 due
Fr, May 14	L25. Final Review		
Tu, May 25	**FINAL EXAM:** 11:30 – 1:30 pm		