

CSC330 – 01 Class Information and Syllabus

The University of North Carolina at Greensboro

CSC 330: Advanced Data Structures

Instructor: Dr. Mohammad Faridul Haque Siddiqui (Farid)

Lectures: Tues/Thurs 12:30 pm - 1:45 pm (Online)

Office: Physical: Petty 156, Online: through Zoom

Office Hours: Tue/Thurs 2:00 pm - 3:00 pm (through Zoom), or by appointment

E-mail: m_siddiq@uncg.edu

Textbook(recommended):

Mark Allen Weiss. Data Structures and Problem-Solving Using Java,4th edition, Addison Wesley, ISBN0-321-54140-5.

Catalog Description: Static and dynamic data structures emphasizing binary trees and graphs. Advanced programming techniques. Advanced sorting and searching algorithms. Hashing techniques. Performance analysis. Methods of developing large applications programs.

Prerequisites: Students should have completed CSC 230 and CSC 250 with a C or better in each. See the end of this handout for detailed information on assumed background.

Student Learning Outcomes: Upon successful completion of this course students will have demonstrated that they

1. understand and use advanced features of Java such as inheritance and generics;
2. can design divide-and-conquer algorithms using three steps and apply to merge sort, quicksort, dynamic programming, and backtracking;
3. understand tree representation and traversals;
4. understand associative containers, red-black trees, and hashing;
5. understand graph representations, traversals, and basic graph algorithms.

Class Structure: Class will meet twice a week for 75 minutes online (through zoom). Class time will include overviews of the material, but students are expected to have completed the textbook readings before class.

Assignments: Assignments will be both theoretical and programming. Programs must be written in Java and must compile and work correctly in NetBeans version8.1 withJava8 (this is the version on the UNCG Computer Lab machines and is freely available to download and install on your personal computers). The instructor will not make any adjustments to a student's code when grading, so if any submitted program does not compile the student will get a zero. Programs will be turned in electronically, and

theoretical assignment solutions must be turned before the beginning of class (electronically).

Late Policy: Assignments are due at the beginning of class on the due date and may be turned in up to 7 calendar days late with a 25% late penalty. Students with planned absences, whether for university events, religious observance, or other reason, are expected to make arrangements with the instructor to turn in assignments before the scheduled date of the assignment. No assignment will be accepted more than 7 calendar days after the original due date!

Exam/test won't be possible due to online version. Although, later if possible, instructor might take exams electronically and the dates will be announced at least one weeks in advance if possible. A missed exam may be made-up only if it was missed due to an extreme emergency and arrangements are made before the exam date. Exams (including the final) may not be taken early or late due to personal travel plans.

Evaluation and Grading: Each student activity will contribute to the final grade in the class according to the following percentages.

- | | |
|----------------------|-----------|
| 1. Assignments (3): | 40 points |
| 2. Exams / Quiz (3): | 60 points |

Tentative Schedule:

Topic	Reading
Class Introduction	
CSC 230 Review	4, 6.1 – 6.6
Sets and Maps	6.7 – 6.8
Trees: Definitions and Traversals	Chapter 18
Binary Search Trees: Basics	19.1 – 19.3
Binary Search Trees: Balancing –concepts	19.4
Binary Search Trees: Red-Black Trees	19.5
Hashing –Part1	20.1 –20.3
Hashing –Part2	20.4 –20.6
Priority Queues and Heaps	21.1 – 21.3, 21.5
Algorithm design: Divide and Conquer	7.5, 8.5, 8.6
Algorithm design: Dynamic Programming	7.6
Algorithm design: Backtracking	7.7
Algorithm design: Greedy	12.1

Graphs: Terminology, Representations, and Traversals	
Graphs: Terminology, Representations, and Traversals - cont'd	14.1–14.2
Weighted Graphs and Paths	14.3–14.4
Acyclic Graphs and Applications	14.5
Minimum Spanning Trees	
Final Day	

Academic Integrity: A vector graphic of a scale used as a symbol of the justice system. The Department of Computer Science seeks to comply fully with the Academic Integrity Policy (<https://osrr.uncg.edu/academic-integrity/>) set forth by the University. As such, any observed violation of this policy will result in the following:

1. The instructor will determine a grade related sanction (e.g., zero for the assignment, failure of the course).
2. If this is the first noted violation within the department, the instructor may decide to report this violation at the department level only. If the instructor deems this violation to be sufficiently severe, however, it may be reported at the university level regardless of any prior violations.
3. In all cases, if there is a record of a previous violation, this violation will be reported to the university.

Attendance Policy:

- Attendance is a key component in learning. While this course is online, it is still a synchronous class. You must attend during your scheduled class section time.
- Attendance will not be taken in class, and is voluntary; however, all students are responsible for everything done or said in class (this can include changes in assignments, due dates, etc.). The university allows for a limited number of excused absences for religious observances —students who plan to take such an absence should notify the instructor at least two weeks in advance so that accommodations can be made (see the late work policy below).
- It is the student’s responsibility to obtain notes from another student if they miss class. The instructor will not give private instruction for missed lectures nor will the instructor provide personal lecture notes. Get the notes from another student, review the material, and then seek assistance for topics that are not clear.
- Note that there is no intention to make recordings of lectures available. You should plan to attend the lectures in real time.

In-class Behavior: When you are in class you should be focused on the class, and you should act in a professional and mature manner. During class there should be no cellphone use, non-class related laptop use, e-cigarettes, or anything else that does not pertain to the class activities. Any distracting items may be confiscated at the discretion of the instructor.

ADA Statement: UNCG seeks to comply fully with the Americans with Disabilities Act (ADA). Students requesting accommodations based on a disability must be registered with the Office of Accessibility Resources and Services located in 215 Elliott University Center: (336)334-5440([orhttp://oars.uncg.edu](http://oars.uncg.edu)).

University Closings: If university facilities are closed due to flu outbreak or other emergencies, it does not mean that classes are canceled. In such an event, please check the class web page and Canvas site for information about if and how the class will proceed.

Necessary Prerequisite Background: To enroll in this class, you must have made a C or better in CSC130, CSC230, and CSC250. Through CSC130 and CSC230, you should have a fairly thorough background in basic Java programming (both syntax and design). You should also have seen and used some of the more advanced features of Java, and while you are not expected to be experts in the set topics yet, it is your responsibility to review or brush up on these topics as needed. We will use these Java features extensively in the class, and through discussion and practice these concepts should become more and more clear as the class progresses. Some specific advanced topics, with references to material in the CSC230 book (Data Structures and Abstractions with Java, 4th edition, by Carrano and Henry) and the book for this class, are given below:

Topic	Carrano (CSC230) Ref	Weiss (CSC330) Ref
Object Oriented Design Composition Inheritance Polymorphism Abstract classes Interfaces	Appendix D (pp. 869 – 886) Java interlude 7 (pp. 499 – 500)	Sections 4.1- 4.6 (pp.109 -149)
Generics	Java interlude 1 (pp. 53 – 58) Java interlude 3 (pp. 235 – 244)	Section 4.7 (pp. 150 – 156)
Exceptions	Java interlude 2 (pp. 95 – 102) Java interlude 4 (pp. 293 – 300)	Section 2.5 (pp. 47 – 51)
I/O, Scanner, Files	Appendix B	Section 2.6 (pp. 51- 58)

You should also be familiar with elementary linear data structures from CSC 230, including arrays, lists (singly and doubly linked), stacks, and queues, as well as recursion and algorithms for searching and sorting. From CSC 230 and 250 you should be good at basic running time analysis using asymptotic notation. Finally, you should know basic discrete mathematics concepts and be able to write simple proofs.

As UNCG returns to face-to-face course offerings in fall 2020, the campus community must recognize and address concerns about physical and emotional safety. As such, all students, faculty, and staff are required to uphold UNCG's culture of care by actively engaging in behaviors that limit the spread of COVID-19. Such actions include, but are not limited to, the following:

- [Wearing a face covering that covers both nose and mouth](#)
- Observing [social distance](#) in the classroom
- Engaging in proper hand washing hygiene when possible
- [Self-monitoring for symptoms of COVID-19](#)
- Staying home if you are ill
- Complying with directions from health care providers or public health officials to quarantine or isolate if ill or exposed to someone who is ill.

Instructors will have seating charts for their classes. These are important for maintaining appropriate social distance during class and facilitating contact tracing should there be a confirmed case of COVID-19. Students must sit in their assigned seat at every class meeting and must not move furniture. Students should not eat or drink during class time.

A limited number of disposable masks will be available in classrooms for students who have forgotten theirs. Face coverings will also be available for purchase in the UNCG Campus Bookstore. Students who do not follow masking and social distancing requirements will be asked to put on a face covering or leave the classroom to retrieve one and only return when they follow these basic requirements to uphold standards of safety and care for the UNCG community. Once students have a face covering, they are permitted to re-enter a class already in progress. Repeated issues may result in conduct action. The course policies regarding attendance and academics remain in effect for partial or full absence from class due to lack of adherence with face covering and social distancing requirements.

For instances where the Office of Accessibility Resources and Services (OARS) has granted accommodations regarding wearing face coverings, students should contact their instructors to develop appropriate alternatives to class participation and/or activities as needed. Instructors or the student may also contact [OARS](#) (336.334.5440) who, in consultation with Student Health Services, will review requests for accommodations.