COMP 210 – Data Structures and Analysis

Fall 2023, Sections 1 & 2

Course Instructor: **Sayeed Ghani**
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Office hours: Tuesdays & Thursdays: 11:00am – 12:00noon.
via **My Digital Hand,** or by appointment taken via e-mail.

Credit Hours: 3

Prerequisites: COMP 110 or equivalent

Lectures:

Section 1: Mondays & Wednesdays, 2:05 – 3:20pm, Hanes Art Center – Rm 121.
Section 2: Tuesdays & Thursdays, 9:30 – 10:45pm, Manning – Rm 209.
First classes are on Mon/Tue, August 21st / 22nd, 2023.

Textbook and Resources:

The course web page on Sakai is the primary resource for this course. There is no textbook for COMP210. There will be occasional readings, reference material, and tutorials via the course website and e-mail announcements.

However, students interested in a text that covers the material in the course may find one of the following resources helpful:

- Think Data Structures, freely available here: https://www.cs.unc.edu/~kmp/comp390-080sp20/thinkdast.pdf (Thanks to Prof. Mayer-Patel).
- Open Data Structures (Java Edition): https://opendatastructures.org

Course Description, Topics and Grading:

This course will teach you how to organize the data used in computer programs so that manipulation of that data can be done efficiently on large problems and large data instances. Rather than learning to use the data structures found in the libraries of programming languages, you will be learning how those libraries are constructed, and why the items that are included in them are there (and why some are excluded).

- You will gain familiarity with important categories of problems that are commonly encountered in software development and will learn what data organizations will allow practical and efficient solutions to those problems.
- You will learn the basics of how to describe and analyze the performance and efficiency of your algorithms; this will prepare you for the upper-level courses in algorithm analysis.
- You will demonstrate the concepts you learn by encoding them in correct Java programs.
- You will gain more proficiency in basic programming and in constructing larger programs than you have been doing in your intro classes.
- Mastery of the data structures taught in this course will prepare you to study higher level areas where those data structures are heavily used: operating systems, networking, graphics, image processing, compilers, databases, robotics to name a few.

This course is intended for people who already have some experience with programming although not necessarily in Java. We assume you have already learned the following basic programming concepts either in a formal course or via prior experience:

- Primitive types (integers, real numbers, Booleans), Variables, Constants, Expressions, Assignments, Comments, Arrays, Loops, Procedures/functions/methods.

The target audience for this course includes students intending to major in computer science and students with some programming experience interested in developing a more formal approach to computer programming.

COMP 110 or an equivalent course in basic programming in high school or another institution is a prerequisite. Students with sufficient experience with programming as a hobbyist or in a work environment may also take the course.

Topics:

Following is a broad list of topics to be covered:

- Java programming language and particularly abstraction and encapsulation methods
- Asymptotic analysis of data structure performance (Big Oh)
- Data structures as abstractions
- Linear data structures (lists, stacks, queues)
- Trees and binary trees, and balanced binary trees
- Sorting, Binary heaps
- Hashing and hash maps
- Graphs theory and algorithms for graphs (shortest path, min spanning tree)

Assignments, Exams and Grading:

There will be about 7 assignments, two midterms and a final exam. The lowest assignment and midterm will be dropped.

The exam dates are as follows (unless otherwise informed):
S1=M/W Section 1, S2=Tu/Th Section 2

- **S2: Midterm 1: Tuesday, September 26th, 2023, during class timings**
- **S1: Midterm 1: Wednesday, September 27th, 2023, during class timings**

- **S2: Midterm 2: Tuesday, October 31st, 2023, during class timings**
- **S1: Midterm 2: Wednesday, November 1st, 2023, during class timings**

- **S1: Final Exam: Friday, December 8th, 2023, 4-7pm.**
- **S2: Final Exam: Friday, December 12th, 2023, 8-1am.**

All exams will be closed book and conducted in your regular classroom.

Grading Criteria:

- 30% Assignments (best 6 of 7)
- 30% Mid-Term (best of 2)
- 40% Final Exam

Late assignments will have 1 mark deducted for each late day.

Grading Scale Breakdown:

- A-: 90-92 A: 93-100
- B-: 80-82 B: 83-86 B+: 87-89
- C-: 70-72 C: 73-76 C+: 77-79
- F: 59 or below D: 60-69

In case of fractional points, grades will automatically be rounded up if greater than or equal to 0.5. E.g. 89.50 is rounded up to 90 which is an A-, but 89.49 is rounded to 89 which is a B+.

Technologies:

Sakai:

Sakai will be used for all official course communication (assignments, announcements, lecture notes, gradebook, etc.). Registered students should already have access to the course Sakai site: https://sakai.unc.edu/portal/site/comp210-f23 .

Zoom:

All lectures (except 1st week) will be conducted in person and can also be joined via Zoom using the following links:

Section 1 (M/W 2:05-3:20pm):
https://unc.zoom.us/j/93282524913?pwd=UFdtTlkvYnBPdkNjR1B0Y0tDRzJZUT09
Meeting ID: 932 8252 4913, Passcode: 895932

Section 2 (Tu/Th 9:30-10:45am):
https://unc.zoom.us/j/98144520222?pwd=ODNQb1ZvdnpvODY2bVFoNzM2TzZKdz09
Meeting ID: 981 4452 0222, Passcode: 365212

The 1st week's lectures will only be conducted via Zoom this semester and students can attend online or in the designated class room.

All lectures are generally recorded on Zoom and an edited version (usually excluding administrative announcements) should generally be available for viewing after 24 hours of the lecture. However, students are strongly encouraged to attend the lectures in person.

GitHub:

GitHub will be used to distribute example code and material to students as well as for submitting assignment code. All students are expected to create a Github account at http://github.com

My Digital Hand(MDH):

MDH will be used for all office hours with TA/LAs and the instructor. Links for MDH will be posted via Sakai announcements.

Piazza:

Piazza will be used for peer-to-peer communication. Students should think of Piazza as a virtual study group attended by all the students in the class. In general, students should NOT expect Piazza to be a tool for communicating with instructors. Although instructional staff may answer questions and/or clarify answers provided by others, students should not necessarily expect an answer. Students should not post solutions or significant portions of programming assignments to Piazza. A more complete guide to appropriate Piazza use can be found here: http://www.cs.unc.edu/~kmp/comp390-080sp20/piazza-guide.html (Thanks again to Prof. Mayer-Patel and Prof. Clarkson).

Students can join Piazza at:
https://piazza.com/unc/fall2023/comp210sec12 , access code: **mblt5sjdqph**

[COMP 210 (SEC 1 & 2): Data Structures].

Gradescope Autograding:

Your programming assignments will be submitted through Gradescope, graded there, and results returned to you. Access the site: https://www.gradescope.com/courses/580584 and create a login. The entry code is: **7G6NPR**

Grades on programming assignments may have two components: autograded points and manually graded points. You should take note of how many autograded vs. manually graded points there are ahead of submission. You are permitted, and encouraged, to resubmit your programming assignments as many times as you need to earn full credit on the autograded points of an assignment. There is no penalty for resubmission. The autograder will run and assign a score within a few minutes of submission. We will not go back and manually assign any credit for autograder points you failed to earn, so you may know and be aware of your autograded points upon submission. If you do not understand the error output of some autograded point deduction, please contact the TAs/LAs.

Honor Code and Collaboration Policy:

To do well in this course, you must come to your own individual understanding of the material. As such, collaboration is prohibited outside of the policies given below.

Collaboration Policy on Ungraded, General Course Concepts:

You are encouraged to discuss general course concepts (i.e., not assignment-specific) material with anyone, including other current students and tutors. This includes going over lecture slides, documentation, code examples covered in lecture, study guides, etc. The examples you use to discuss general course materials must be from lectures or your own creativity, you cannot use examples directly drawn from any assignments handed in.

Collaboration on Graded Work:

No collaboration with peers inside the course, or anyone outside the course, except for our course TAs while they are working as a TA, is allowed on exercises, quizzes, and exams. Your ability to complete each individually is critical for your ability to do well in this course. Illegal collaboration is easily detected in COMP 210 because Gradescope has built-in support for

Stanford's MOSS program (Measures of Software Similarity), as well as other machine learning techniques.

Permitted Resources on Graded Work:

- Materials on the course website and any linked resources
- Instruction received from TAs / LAs
- Official programming language documentation
- Online documentation for specific errors you encounter

The following are not permitted resources on coursework handed in for credit and are considered honor code violations:

- Asking for help on an assignment or assessment on any mobile or web application such as GroupMe, Group Chat, etc.
- Looking at someone else's screen, whether in person or shared remotely, while working on an assignment. Letting someone else look at or share your screen.
- Copying code found on any website or community such as Stack Overflow, GitHub, Chegg, or Course Hero.
- Sharing or reusing code with any peer currently in the course or anyone who has previously taken the course.

Disclaimer:

The professor reserves to right to make changes to the syllabus, including due date, test dates, and percentages credit for various categories of work. These changes will be announced as early as possible.

UNC ACADEMIC POLICIES AND SERVICES

HONOR CODE

Remember that as a student of UNC-Chapel Hill, you are bound by the University's Honor Code, which states that "It shall be the responsibility of every student at The University of North Carolina at Chapel Hill to obey and support the enforcement of the Honor Code, which prohibits lying, cheating, or stealing when these actions involve academic processes or University students or academic personnel acting in an official capacity." An especially serious Honor Code violation is plagiarism. You may wish to take a tutorial on plagiarism that was developed by librarians at UNC, Duke, NCSU, and NCCU. If you have questions, please consult your instructor. Please note that downloading or printing out the quizzes or exams in Sakai is prohibited; doing so is considered a violation of the Honor Code.

Plagiarism

Plagiarism is a serious violation of the Honor Code. To become more familiar with the issues surrounding plagiarism, and how to best avoid this academic issue, view this brief Plagiarism Tutorial created by the librarians of UNC-Chapel Hill, Duke University, NC State University, and NC Central University. If you have any questions about what constitutes plagiarism or how to properly cite a source, please contact your instructor.

IT ACCEPTABLE USE POLICY

By enrolling as a student in this course, you agree to abide by the University of North Carolina at Chapel Hill policies related to the acceptable use of IT systems and services. You may be asked to participate in online discussions or other online activities that may include personal information about you or other students in the course. The rights and protection of other participants are protected under the UNC-Chapel Hill Information Technology Acceptable Use Policy, which covers topics related to using digital resources, such as privacy, confidentiality, and intellectual property.

Consult the University website "Safe Computing at UNC" for information about the data security policies, updates, and tips on keeping your identity, information, and devices safe.

DATA SECURITY AND PRIVACY

University and LMS Privacy Policies

- UNC-Chapel Hill Privacy Statement
- Sakai's Discussion Forum, Assignments, DropBox, Gradebook, and Tests & Quizzes tools are designed to share FERPA-protected information privately between instructors and individual students.

UNC-Supported Vendor Privacy Policies

- Microsoft
- Zoom
- Warpwire

When using online resources offered by organizations not affiliated with UNC-Chapel Hill, such as Google or YouTube, please note that the terms and conditions of these companies and not the University's Terms and Conditions apply. These third parties may offer different degrees of privacy protection and access rights to online content. You should be well aware of this when posting content to sites not managed by UNC-Chapel Hill. When links to sites outside of the unc.edu domain are inserted in class discussions, please be mindful that clicking on sites not affiliated with UNC-Chapel Hill may pose a risk for your computer due to the possible presence of malware on such sites.

ACCESSIBILITY

Office of Accessibility/Accommodations

If you are a student with a documented disability, you can receive services through Accessibility Resources & Service (ARS). You must self-identify through ARS to receive services or accommodation from either of these offices. ARS works closely with programs, offices, and departments throughout the University to help create an accessible environment.

The office is located in Suite 2126 of the Student Academic Services Building (SASB), 450 Ridge Road, Chapel Hill, NC, and is open from 8 am to 5 pm Monday through Friday. You can contact them by phone at 919-962-8300 or 711 (NC-RELAY), or by email at accessibility@unc.edu.

Accessibility Statements

University and LMS Accessibility Statements

- UNC-Chapel Hill Accessibility Statement
- Sakai Voluntary Product Accessibility Statement

External Applications integrated into the LMS Accessibility Statements

- Warpwire Accessibility Statement

Supporting Sites and Technologies Accessibility Statements

- Microsoft Office Accessibility Statement
- YouTube Accessibility Statement

STUDENT SUPPORT

Cancellation, Withdrawal, and Suspension

A registered student may terminate registration in three possible ways: cancellation, withdrawal, and suspension, depending on the circumstances. For definitions of these terms and the steps necessary to process each of them, see the University Policy Memorandum.

Policy on Non-Discrimination

The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the University's Policy Statement on Non-Discrimination offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, creed, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered and that equitable and consistent standards of conduct and performance are applied.

Reporting Harassment or Discrimination

If a student is experiencing harassment or discrimination, they can seek assistance and file a report through the Report and Response Coordinators (see contact info at safe.unc.edu) or the Equal Opportunity and Compliance Office.

Any administrator or supervisor, including a department chair, associate dean or other administrator, who receives notice of a student's complaint of alleged prohibited harassment, including sexual misconduct, or discrimination must contact the Equal Opportunity/ADA Office as soon as possible upon receipt of the complaint at 137 E. Franklin St., Suite 404, 919-966-3576.

Faculty and staff who experience discrimination or harassment can file a complaint on the Equal Opportunity and Compliance Office web site (look for the "Make a report" link on that page).

Gender-Inclusive Language

The University of North Carolina at Chapel Hill is committed to providing an inclusive and welcoming environment for all members of our community. Consistent with that commitment, the gender-inclusive terms (chair; first-year student; upper-level student, etc.) should be used on University documents, websites and policies.

The UNC Writing Center has a handout on Gender-Inclusive Language.

Student Support Email and Phone Numbers

- To report acceptable use problems at UNC-Chapel Hill, call **919-962-HELP** or email: abuse@unc.edu.
- For issues involving copyrights or other policy concerns, call **919-445-9393** or email: copyright@unc.edu.
- For issues involving system security, call **919-962-HELP** email: security@unc.edu.
- For any other issues, please send email to abuse@unc.edu.