

CSC 402: Data Structures I

Kenny Davila Castellanos

AY 2023-2024 - Winter Term

1 General Information

Instructor: Kenny Davila Castellanos
Term: Winter 2023-2024
Sections: 801 - (Class number 22806) - In Person
810 - (Class number 22917) - Online Async (Sync-Option)
Time: Tuesday 5:45PM - 9:00PM
Location: CDM - 206 Loop

2 Course Description

A first course on data structures in Java for graduate students. The course introduces Java programming from within the context of data structures. The course covers arrays, linked lists, stacks and queues, data structures supporting disjoint-set operations, and discusses recursion and performance analysis. The implementation of the basic operations on each data structure are discussed and analyzed in terms of their efficiency.

PREREQUISITE(S): CSC 401

3 Course Evaluation

- **Weekly Coding assignments:** 20%
- **Mini-projects:** 20%
- **Exams:** 60%

3.1 Weekly Coding assignments

There will be a total of 9 weekly assignments. These will focus on the weekly lecture materials, with the goal of helping you master the newly studied concepts. They will become available a few hours before or after the weekly lecture, and they will be due by 11:59pm of the day before the next lecture. All programming assignments that do not compile will receive zero points. Students should make sure that their code compiles before submission.

A write-up and initial code skeleton will be provided for each weekly assignment. You should read the document carefully. It is your responsibility to make sure that you understand what you are being required to do. If something is unclear, please ask me about it as early as possible. I might not be able to help on time if you ask me the same day that the assignment is due.

Programs that do something different from what is being asked are not eligible for partial credit. Programs that use a very different approach from what is being required will also receive 0. For example, if you are supposed to use lists, but instead you use a different data structure, you will automatically receive 0, no partial credit even if the program solves the task.

3.2 Mini-projects

These are longer and more challenging than the weekly assignments. You will be given at least 2 weeks to complete each mini-project, but these will typically overlap with the weekly assignments, so plan accordingly. There will be a mini-project due before the midterm and another on the second half of the class due before the final.

Unlike weekly coding assignments, the goal of the mini-projects is to analyze the performance of your code beyond simple task completion. That is, your main task is to actually run a few experiments using your code. You will typically need to run your code several times using different data or parameters, in order to understand how the program behavior changes as a function of its inputs. You might also need to compare different algorithms for the same task. Finally, you will have to write a report to describe your code, experimental results, and analysis. In a way, the report is more important than the code itself, but you will not be able to write the report if your code does not work properly.

3.3 Exams

We will have a midterm on Week 6, and the final in Week 11. Both exams will be given on paper, in person. There are no online exams. You must appear physically in front of a proctor (either the instructor or someone else, as described in the policy linked below.)

- Students in the in-person section must take the exam on the chosen day and time, as announced on the course schedule.
- Students in online sections (synchronous or asynchronous) must register with a proctor for both exams. In order to register, use the CDM Proctored Exams section of the course homepage on D2L. You must register at least a week before the exam. Please do it ASAP. For further information, see <https://www.cdm.depaul.edu/onlinelearning/pages/exams.aspx>

You must pass the final exam in order to pass the course. Exams will include multiple problems of similar difficulty to the homework, and you need to be able to solve them within just a few minutes. **Remember that you will be working alone, on paper, without any external resources.** Therefore, it is your responsibility to ensure that you can complete any given individual functions from the homework code in about five minutes under similar conditions. To solve the weekly homework, you may find it useful to consult external resources at first. That's fine as long as you do not fall into plagiarism. However, it is then incumbent on you to repeat those problems until you can do them yourself, starting from scratch, in a reasonable amount of time (about five minutes).

4 Java Environment

We will be using JAVA SE 17 (latest LTS version). You might use newer editions, but I should be able to compile your code using this version of Java.

The main IDE for the class will be: IntelliJ IDEA Community Edition . I will not be providing support for any other IDEs. You can certainly work your code using other tools/IDE that you prefer, but your final submission must run and compile easily using IDEA. Submissions that I cannot run, or that would require significant changes to make them run in my environment will receive a 0 even if they work perfectly on your computer.

5 Discussion Forum

For in-person students, live discussions can happen regularly during lecture time. For online students who opt to use the synchronous option, they will be able to join these discussions using zoom. To join a meeting, use the link listed on the D2L calendar of events.

We will use discord as a discussion forum for class.

- It is recommended to download the native discord app for your computer and/or mobile device. Alternatively, use the web browser client. Join the class server at: <https://discord.gg/DyQYBvKV>.
- Change your nickname to be your first and last name. Use whatever firstname you prefer, but be sure that your last name is the same as it is in DePaul's Campus Connect.

- Always be polite.
- Use appropriate language.
- No trolling.
- Only students enrolled in the class will be allowed in the server.

The discussion forum is an extension of our time in class. This is particularly great for students that cannot attend the live lectures. As we move forward in content, multiple students are likely to share similar questions. The discussion allows to answer these common questions for everyone at once.

6 Course Homepage for Lectures

I will be using D2L as the primary website for posting lecture slides and provide links for any additional resources. Slides might not be available before class, and when they are, they might be subject to changes after the class.

7 Contact Information

- **Instructor:** Kenny Davila Castellanos
- **Email:** kdavilac@depaul.edu
- **Address:**
School of Computing, DePaul University
243 South Wabash Avenue
Chicago, IL 60604-2301
- **Office:** CDM 702
- **Class Hours:** Tu 5:45pm-9:00pm

A few things to note:

- If you would like to talk, book an appointment on BlueStar or email me – Phone is the least preferred communication method.
- You can expect that I will respond to email and discord messages within 24 hours on business days.
- You can expect grades to be posted within a week of the due date.

8 Textbooks

If you are delayed in getting the texts, you can view them online at O'Reilly: <https://go.oreilly.com/depaul/>.

8.1 Required Books

- Core Java SE 9 for the Impatient, 2nd Edition [Amazon, Indiebound]
by Cay Horstmann (Addison-Wesley, 2017)
Available as Ebook
(Online version)
Companion site
Older edition is fine.
- Algorithms 4e [Amazon, Indiebound]
by Robert Sedgewick and Kevin Wayne (Addison-Wesley, 2011)
Available as Ebook
(Online version)
(Author videos) These are also for sale as an Ebook
Companion site.
Do not get an older edition. They are completely different books.

8.2 Recommended Books

- Schaum's Outline of Data Structures with Java 2e [Amazon, Indiebound]
by John Hubbard (Schuams, 2009)
This book is a good source of example problems with solutions.
Available as Ebook

8.3 More Books

- How to Think Like a Computer Scientist
by Allen B. Downey.
Free!
An good introduction to Java.
Skip the GridWorld chapters, which are intended to help with the AP exam in CS.
See also these lecture notes from MIT. The first three lectures are particularly useful.
- Java for Python Programmers
by Brad Miller.
Free!
See also here.
- Introduction to Programming in Java (Chapter 1)
by Robert Sedgewick and Kevin Wayne
Free!
This is the first chapter of the introductory text written by the authors of our primary textbook.
It presents the same material as section 1.1 of the primary text, but at a slower pace.
- Effective Java 3e [Amazon, Indiebound]
by Joshua Bloch (Addison-Wesley, 2008)
Available as Ebook
(Online version)

The algorithms text describes all of the Java that is required for the class. The discussion is terse, making it an excellent reference. If you would like a longer discussion of Java, you might want a supplementary text. In this case, you might consider one of the following.

- Kathy Sierra and Bert Bates's "Head First Java" (Online version)
- Bruce Eckel's "Thinking in Java" (3e available for free for download online and fine for our purposes)
- David Flanagan's "Java in a Nutshell" (Online version)
- Cay Horstman's "Big Java" (Online version)

9 General Expectations

The theoretical foundations and some code examples will be covered in the lectures. However, to master Java, you will have to practice outside of the classroom. We will not spent too much lecture time to cover the very basics of Java, you will have to study these from the recommended textbooks and other sources.

You will have weekly programming assignments. You should always start them early, you are given a week to complete them for a reason. You do not have to do it alone, but you must be self-motivated. You can ask me and other members of the class. However, keep in mind that the goal is that by the end of the class, you are able to solve these problems on your own. Do not simply try to get programs that will produce the right output, focus on understanding deeply each solution and think of similar problems that could be solved using these methods.

10 Lecture Recordings for Asynchronous Students

Synchronous lectures are recorded for access after class. You will find the lectures on D2L.

11 Course-specific Policies

11.1 General

You must attend class!

11.1.1 Incomplete Grades.

An incomplete grade is defined in the Student Handbook as follows (note that the policy in the undergraduate student handbook applies to both undergraduate and graduate students): A temporary grade indicating that the student has a satisfactory record in work completed, but for unusual or unforeseeable circumstances not encountered by other students in the class and acceptable to the instructor is prevented from completing the course requirements by the end of the term. Please see <https://www.cdm.depaul.edu/Student-Resources/Pages/Grading-Policies.aspx> for additional information.

11.1.2 Retro-Active Withdrawal.

CDM understands certain extenuating circumstances can hinder one's ability for academic success and completion of course work. Please see <https://www.cdm.depaul.edu/Student-Resources/Pages/Enrollment-Policies.aspx> for additional information.

11.1.3 Absence Notifications

In order to petition for an excused absence, students who miss class due to illness or significant personal circumstances should complete the Absence Notification process through the Dean of Students office. The form can be accessed at <https://offices.depaul.edu/student-affairs/about/departments/Pages/dos.aspx>. Students must submit supporting documentation alongside the form. The professor reserves the sole right whether to offer an excused absence and/or academic accommodations for an excused absence.

11.2 Supplemental Instruction Review Sessions

This course was selected to participate in DePaul's Supplemental Instruction (SI) program. SI is a series of peer-led review sessions based on an internationally-recognized evidence-based active learning model for students taking historically difficult courses. SI is free and for ALL students who want to strengthen their understanding of course material and improve their grades.

At each session you will be guided through collaborative learning strategies by your SI Leader, a DePaul student who has previously taken the course and done well. SI sessions offer a chance to work together with classmates to compare notes, practice important concepts, develop effective study methods, and test yourselves before quizzes and exams.

Your SI Leader will facilitate either (3) 1-hour SI sessions or (2) 1.5 hour SI Sessions per week between weeks 2-10. Sessions are offered on-campus and online. Please complete the poll your SI Leader will send to you the first week to help them plan the most accommodating session days/times and modality for you.

Session times can be found on the Supplemental Instruction website, go.depaul.edu/si. If you are unable to attend a session, you will be able to access the recordings of online sessions.

11.3 Code Generators

The usage of code generator based on AI (Chat-GPT, Auto-pilot, etc.) is not allowed for this class. The objective of the course is for the students to learn the basic theory about data structures and to develop the required coding skills to use them in practice without requiring the assistance of external tools. To ensure some compliance with this policy, some of the main evaluations for this course will be paper-based.

12 School Policies

12.1 Changes to Syllabus

This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, posted under Announcements in D2L and sent via email.

12.2 Online Course Evaluations

Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. They are a requirement of the course and are key to continue to provide you with the highest quality of teaching. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation. Students complete the evaluation online in CampusConnect.

12.3 Academic Integrity and Plagiarism

This course will be subject to the university's academic integrity policy. More information can be found at <http://academicintegrity.depaul.edu/> If you have any questions be sure to consult with your professor.

All students are expected to abide by the University's Academic Integrity Policy which prohibits cheating and other misconduct in student coursework. Publicly sharing or posting online any prior or current materials from this course (including exam questions or answers), is considered to be providing unauthorized assistance prohibited by the policy. Both students who share/post and students who access or use such materials are considered to be cheating under the Policy and will be subject to sanctions for violations of Academic Integrity.

12.4 Academic Policies

All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the University Academic Calendar. Information on enrollment, withdrawal, grading and incompletes can be found at <https://www.cdm.depaul.edu/Student-Resources/Pages/PoliciesandProcedures.aspx>.

12.5 Students with Disabilities

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential. To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the Center for Students with Disabilities (CSD) at:

- Lewis Center 1420, 25 East Jackson Blvd.
Phone number: (312)362-8002
Fax: (312)362-6544
TTY: (773)325.7296