New York University Tandon School of Engineering
Computer Science and Engineering Department

CS-UY 1134: Data Structures and Algorithms
Fall 2020

ALEC	Prof. Katz	Mon, Wed 3:30pm to 4:50pm
CLEC	Prof. Katz	Mon, Wed 5:00pm to 6:20pm

Contact Information

Professor Katz-Braunschweig: dkatz@nyu.edu, 370 Jay Street, 8th floor, room 864

Office Hours

By appointment

Course Prerequisites

CS-UY 1114 with a C- grade or better

Course Description

This course covers abstract data types and the implementation and use of standard data structures along with fundamental algorithms and the basics of algorithm analysis.

Course Objectives

At the completion of this course a student will:

1. Be familiar with basic techniques of algorithm analysis
2. Be able to design and analyze recursive algorithms
3. Be familiar with fundamental data structures, their implementation and performance: dynamic arrays, stacks and queues
4. Master the implementation of linked data structures such as linked lists and binary trees
5. Be familiar with advanced data structures such as search trees, hash tables, priority queues and graphs
6. Have a practical understanding of the concepts of data abstraction.
7. Be familiar with several searching and sorting algorithms including insertion-sort, merge-sort and heap-sort

Course Structure

Most of the material will be presented in lectures. Reading assignments from the textbook, programming and other exercises in the lab, and weekly homework assignments will reinforce this material. You should expect to spend a substantial time outside the class working on the homework assignments.

Assignments and other important announcements will be posted on NYU Classes. You should check the course page every day and sign up for e-mail notification of announcements.

Readings

The textbook for the course is:
Data Structures and Algorithms in Python ,1st Edition, Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser. ISBN-13: 978-1118290279. ISBN-10: 1118290275.

There is also an electronic version of the textbook, which is less expensive. Copies are available in the NYU bookstore, as well as other book vendors. Several copies are on reserve in the Dibner Library.

Course requirements

Tests: There will be two midterm exams and a final exam. These exams will include some short answer and/or multiple choice questions, as well as programming problems.

Homework assignments: Will reinforce the material covered in the lectures and in the textbook. Although these count for a relatively small percentage of your grade, it is essential that you do them and understand the solutions. *It is unlikely that you will do well on the exams if you do not understand how to solve problems like the homework exercises.*

Labs: You are expected to come on time to all labs, complete the required work, and help others if you finish early. Your lab grade will mostly reflect the effort you made to solve the problems during the lab time.

Grading

Grades will be computed roughly as follows:

15% First midterm exam + 20% Second midterm exam + 25% Final exam
+ 20% Homework + 15% Lab grade + 5% participation

We may tweak the formula a little, for example, by slightly changing the weights.

Course Topics

- Python review and additional topics (Chapters 1-2)
- Asymptotic analysis (Chapter 3)
- Recursion (Chapter 4)
- Dynamic Arrays and Amortization (Chapter 5)
- Stacks and Queues (Chapter 6)
- Linked lists (Chapter 7)
- Binary Trees (Chapter 8)
- Search trees (Chapter 11)
- Hash tables (Chapter 10)
- Priority queues (Chapter 9)
- Sorting and selection (Chapter 12)
- Graph algorithms (Chapter 14)

Important Dates
Wed 2 Sep: First day of classes Mon
Mon 7 Sep: Labor Day, No Classes
Wed 10 Sep: Monday classes meet
Tue 20 Oct: First Midterm Exam
Tue 3 Nov: Last day to withdraw
Tue 17 Nov: Second Midterm Exam
Sun 13 Dec: Last Day of Fall 2020 Classes
15 Dec – 21 Dec: Fall Semester Exams. **The final exam could be any time during this week. Do not buy plane tickets or make any other travel arrangements that involve leaving before 5/19!!!**

NYU School of Engineering Policies and Procedures on Excused Absences
complete policy here

A. Introduction: An absence can be excused if you have missed no more than **10 days of school**. If an illness or special circumstance has caused you to miss more than two weeks of school, please refer to the section labeled Medical Leave of Absence.

B. Students may request special accommodations for an absence to be excused in the following cases:
   1. Medical reasons
   2. Death in immediate family
   3. Personal qualified emergencies (documentation must be provided)
   4. Religious Expression or Practice

Deanna Rayment, deanna.rayment@nyu.edu, is the Coordinator of Student Advocacy, Compliance and Student Affairs and handles excused absences. She is located in 5 MTC, LC240C and can assist you should it become necessary.

Moses Center Statement of Disability
If you are student with a disability who is requesting accommodations, please contact New York University's Moses Center for Students with Disabilities at 212-998-4980 or mosescsd@nyu.edu. You must be registered with CSD to receive accommodations. Information about the Moses Center can be found at www.nyu.edu/csd. The Moses Center is located at 726 Broadway on the 3rd floor.

NYU School of Engineering Policies and Procedures on Academic Misconduct
complete Student Code of Conduct here

A. Introduction: The School of Engineering encourages academic excellence in an environment that promotes honesty, integrity, and fairness, and students at the School of Engineering are expected to exhibit those qualities in their academic work. It is through the process of submitting their own work and receiving honest feedback on that work that students may progress academically. Any act of academic dishonesty is seen as an attack upon the School and will not be tolerated. Furthermore, those who breach the School's rules on academic integrity will be sanctioned under this Policy. Students are responsible for familiarizing themselves with the School's Policy on Academic Misconduct.

B. Definition: Academic dishonesty may include misrepresentation, deception, dishonesty, or any act of falsification committed by a student to influence a grade or other academic evaluation. Academic dishonesty also includes intentionally damaging the academic work of others or assisting other students in acts of dishonesty. Common examples of academically dishonest behavior include, but are not limited to, the following:

   1. Cheating: intentionally using or attempting to use unauthorized notes, books, electronic media, or electronic communications in an exam; talking with fellow students or looking at another person's work during an exam; submitting work prepared in advance for an in-class examination; having someone take an exam for you or taking an exam for someone else; violating other rules governing the administration of examinations.
   2. Fabrication: including but not limited to, falsifying experimental data and/or citations.
   3. Plagiarism: intentionally or knowingly representing the words or ideas of another as one's own in any academic exercise; failure to attribute direct quotations, paraphrases, or borrowed facts or information.
   4. Unauthorized collaboration: working together on work meant to be done individually.
   5. Duplicating work: presenting for grading the same work for more than one project or in more than one class, unless express and prior permission has been received from the course instructor(s) or research adviser involved.
   6. Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.

In this class, some of the labs will be done with a partner. For homework assignments, you may discuss the general idea of how to approach a program with other students. You may get help debugging a program from another student, though it would be better to get help from a TA. You may **NOT** show completed or substantially completed code to other students, copy code written by others, or get others to write code for you. Violations of this policy will result in a grade of ZERO on the work in question and may result in further disciplinary action.