Computer Science 102
Data Structures
CSCI-UA.0102 Spring 2025

Lecture 1:

Professor: Evan Korth
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Hi, I'm Evan

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csnyc

HACK NY

QUOTIDIAN ventures

paintzen

NYU's MS-CEI

TECHGROK

Why I am here

- I love to teach! Especially you folks.
- I am also here as a resource to you as you navigate your education / career.
- Thinking about an internship? Thinking about a career in CS? Doing a a technical interview? I can give you some advice.

How to reach me

- **Email**: korth@cs.nyu.edu; ekorth@gmail.com
- **Office Hours**: Tuesday 2:00pm - 3:00pm (room 319 WWH)
- **Course Website**:
  - https://cs.nyu.edu/courses/fall25/CSCI-UA.0102-020/index.html
  - Note: I will also use NYU Brightspace but I prefer posting the notes to an open resource.

Who else is here?

- Name
- Major / minor
- Fun fact

Course Prerequisites

- Prerequisite:
  - CSCI-UA.0101 or departmental permission.
- Who should be taking this course:
  - computer science majors and minors and many others
  - If you know Java very well and have experience with data structures and algorithms, you may consider taking the placement exam to skip this class. See me if you are interested.
- You must get a c or better in this class to take further computer science classes.

Course Description

- **Official Description:** Use and design of data structures, which organize information in computer memory. Stacks, queues, linked lists, binary trees: how to implement them in a high-level language, how to analyze their effect on algorithm efficiency, and how to modify them. Programming assignments.

What the class is really about

There are two main goals of this course:

I.   Foundations of Abstract Data Types (ADT)
   a)   What is a data structure?
   b)   Examples of data structures and their real world uses.
II.   Foundations of Asymptotic Analysis
   a)   How do we rate the efficiency of an algorithm?
   b)   How does choosing the right ADT impact an algorithm's efficiency?

Foundations of Abstract Data Types

● An abstract data type (ADT) is a set of objects together with a set of operations. For example:

- Stack

- Queue

- Dictionary

- Tree

- Priority queue

Introduction to Algorithm analysis

- Basically, we want to solve any given problem using the fewest possible computer instructions.
  - Two algorithms may solve the same problem. One may take a few seconds while the other takes a few years. We will analyze our data structures to see why one works better than the other for a given set of data.
- For example, we will learn several sorting algorithms and analyze the efficiency of each.
  - Insertion sort
  - Merge sort
  - Quick Sort
  - Heap sort
  - See: http://math.hws.edu/eck/js/sorting/xSortLab.html

Administrative Matters

Course Web Site

● Course web site is available at:

https://cs.nyu.edu/courses/fall25/CSCI-UA.0102-020/index.html
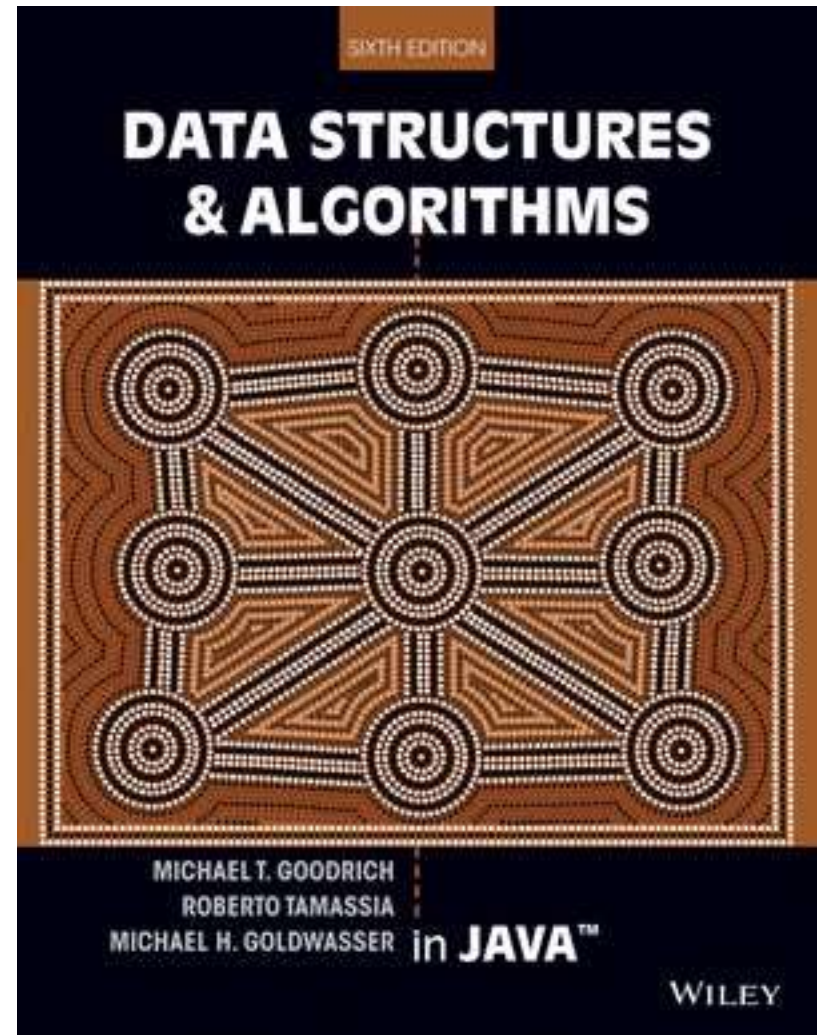
Web site contains the following information:

- Administrative information
- Course Syllabus
- Class notes
- Class programs

NYU Brightspace will be used for:

- Homework assignments
- Communication

Course Text Book

- [Data Structures and Algorithms in Java, 6th edition](), Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser

- ISBN : 978-1-118-77133-4

- Should be available at the NYU Bookstore

- Please keep up with the reading!

Software

● For the course you can use an IDE of your choice. In class I may use any of the following IDE's:

  – Eclipse

  – Netbeans

  – Or the command line

● All these products are free.

Grading

- There will be a series of homework assignments.
- There will be one midterm, some quizzes, and a final.
- Your grade will be determined as follows:
  - Homework (20%)
  - Midterm (20%)
  - Quizzes (20%)
  - Final Exam (40%)
- Class participation will help your grade!

homework

If you do not do the homework programs, you cannot pass the course.

If homework is late, 25 percent is deducted.

After one week of lateness, home work will not be accepted.

Style counts from the beginning of this class.

Submit the program via email to the e-tutor (more on this later)

Back-up your files: For you own good you must save all programs in several places. Computer crashes or lost programs are not valid excuses for not handing in an assignment.
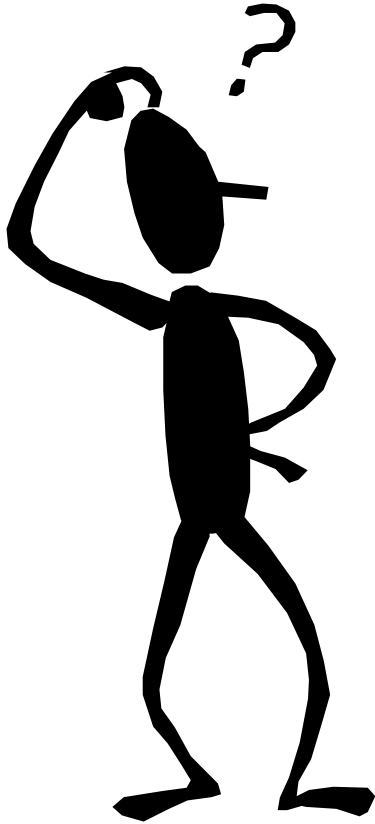
A Word About Cheating

- For the purposes of this class, cheating is defined as by the CS Department's academic integrity policy

  – Discussing homework concepts is fine, but *you must submit your own work*.

- **If you are caught cheating, you will receive an immediate FAILURE for the course.**

Student Civility

● In an effort to make this class enjoyable for everybody…

  – Please be on time to class!

  – Please do not talk to your friends and neighbors in class! It disturbs everyone, and makes it hard to concentrate. If you have a question, just ask me!

  – Please turn your cell-phones off!

Getting Help

- Help is always available!
- Option 0: Tutor hours: We have tutor hours this semester. The schedule will be on the website. They start next week.
- Option 1: Come to my Office Hours
  - Tuesday 2:00pm - 3:00pm
  - Location: WWH, room 319
  - I get bored when nobody visits!
  - If you cannot make my office hours, I will be happy to make an appointment with you. Please try to give me advance warning when you need an appointment.
- Option 2: Brightspace – questions to class
- Option 3: Our IAs.

topics

- Here is a **<u>tentative</u>** list of the topics we will cover:
    - Recursion
    - Asymptotic Analysis of Algorithms: We will just scratch the surface as we look at the efficiency of some of our structures and algorithms
    - Lists
    - Stacks
    - Queues
    - Trees
    - Heaps
    - Sorting & Searching
    - Hashing
    - Priority Queues
    - Graphs
    - Huffman Codes

recitation

- This class has a mandatory recitation. If you are not registered for the recitation, you must do so.
- Recitation will be led by our recitation leaders – see the website.
- **Recitation starts Friday!**
- The first two weeks will cover OOP in Java. You will be assigned an assignment next week that covers that material.