

Data Structures – Spring 2025

CSc21200 Section PR Data Structures, Spring 2025, The City College of New York

Instructor:	Professor Zhigang Zhu
TA	n/a
Class Meets:	T,TH 2:00-3:40 PM
Classroom:	NAC 6/307 [Class Zoom Link when needed]
Office Hours:	Thursday: 11:00 am – 01:00 pm
Office:	In Person (NAC 8/211) Online Meeting (Office Hour Zoom Link)
Email:	Appointments: zzhu@ccny.cuny.edu Assignment Submission: ds.zhu.ccny@gmail.com

Course Update Information

- 01/28/2025. The first day of class.
- 01/29/2025. [Grading for Quiz 1.](#)
- 01/31/2025. [Grading for Quizzes 1-2.](#)
- 02/07/2025. [Grading for Quizzes 1-3.](#)
- 02/02/2025. [Grading for Quizzes 1-4.](#)
- 02/13/2025. [Grading for Assignment 1.](#)
- 02/18/2025. [Grading for Assignments 1 & 2.](#)
- 02/21/2025. [Grading for Quizzes 1-5.](#)
- 02/28/2025. [Grading for Quizzes 1-6.](#)
- 03/05/2025. [Grading for Exam 1.](#) We will go over the exam questions after March 20 and before the second exam to make sure you know what is correct. Right now please focus on the contents for Exam 2, by reviewing Lecture 9 and preview Lectures 10 to 14 before each class.
- 03/06/2025. [Grading for Assignments 1 to 3.](#)
- 03/18/2025. [Grading for Quizzes 1-7.](#)
- 03/21/2025. [Grading for Quizzes 1-8.](#)
- 03/25/2025. [Grading for Assignments 1 to 4.](#)
- 03/21/2025. [Grading for Quizzes 1-9.](#)

- 04/05/2025. [Grading for Exam 1-2](#). We will go over the questions on Exam 2 in class (in-person) on April 10 (Thursday) or April 22 (Tuesday) depending on the lecture progress.
- 04/09/2025. [Grading for Assignments 1 to 5](#).
- 04/24/2025. [Grading for Quizzes 1-11](#) (the last two for class attendance on 04/10 and 04/22).
- 04/25/2025. [Grading for Quizzes 1-12](#).
- 04/29/2025. [Grading for Quizzes 1-13](#).
- 05/02/2025. [Grading for Quizzes 1-14](#).
- 05/07/2025. [Grading for Assignments 1 to 6](#).
- 05/02/2025. [Grading for Quizzes 1-15](#).
- 05/09/2025. [Grading for Quizzes 1-16](#).
- 05/16/2025. [Grading for Exam 1-3 and Bonus Points](#).
- 05/22/2025. [Final Grading for CSC 212 Section PR Data Structures](#), Spring 2025. Have a wonderful summer, everyone!

Course Objectives

This course teaches the basic techniques to organize data in running programs. You will know about well-known data structures as listed in the *Quick Syllabus*:

To become a Data Structures Expert

start by learning...

Pre-condition/Post-condition specifications

Time analysis techniques

Container classes

Pointers and dynamic arrays

Linked lists

Templates and iterators

Stacks & Queues

Recursive thinking

Trees

Sorting and searching techniques

Graphs

You will be able to

- (1) implement these structures as classes in C++;
- (2) determine which structures are appropriate in various situations;
- (3) confidently learn new structures beyond what are presented in this class.

You will also learn part of object-oriented programming and software development methodology.

Textbook and References

- **Textbook:** *Data Structures and Other Objects Using C++*, Third Edition, by [Michael Main](#) and [Walter Savitch](#), Addison Wesley, softcover.
- **Supplements:** The Code for the Book and the Corrections for the Text will be useful and may be found by clicking [here](#).

Prerequisites

CSc103 (*Introduction to Computing* to CS and CpE Majors) or department permission. You should feel confident in your ability to design and implement simple programs using arrays and functions.

Schedule

The following schedule is based on [Spring 2025 academic calendar](#).

[You shall download the entire [Lectures Folder](#) by opening it and downloading it all as a zip file, unzipping it so the following lecture slides and code with links included in slides will be organized in the same “Lectures” folder. You shall download the most up to date slides after each class into the same folder by following the following links. Then you can

view the slides and the code on your local machine when you view the slides in the presentation mode.]

Date	Planned Lecture Topics (with slides and sample code)	Readings & Assignments
Jan 28 (T) Jan 30 (TH)	Lecture 1 . Introduction & Software Development Lecture 2 . ADT & C++ Classes (code in point-ppt.html)	Ch. 1 Ch 2.1-2.3; Assignment 1 [Due Feb 7]
Feb 04 (T) Feb 06 (TH)	Lecture 3 . More Classes and Operator Overloading [Zoom] Lecture 4/5. Container Classes (Slides for Lectures 4&5) (code in bag-ppt.html)	Ch 2.4-2.5 Ch 3, Assignment 2 [Due Feb 14]
Feb 11 (T) Feb 13 (TH)	Lecture 6. Pointers and Dynamic Arrays (I) (Slides for Lectures 6 & 7) Lecture 7. Pointers and Dynamic Arrays (II) (code with pointers in point3/point3-ppt.html)	Ch 4.1 – 4.2 Assignment 3 [Due Feb 28]
Feb 18 (T) Feb 20 (TH)	Monday Schedule – No Data Structures class! Lecture 8 . Dynamic Classes and the Big Three (code in bag2-ppt.html)	Ch. 4.2 – 4.5
Feb 25 (T) Feb 27 (TH)	Exam Review 1 (Chapters 1-4) Lecture 9 . Linked Lists (code in node1-ppt.html)	Ch. 5.1-5.2, Assignment 4 [Due Mar 21]
Mar 04 (T) Mar 06 (TH)	First Exam (Chapters 1-4) Wednesday Schedule – No Data Structures class!	(Chapters 1-4)
Mar 11 (T) Mar 13 (TH)	Lecture 10 . Building & Using the Linked List Toolkit [Zoom] (code in bag3-ppt.html) Lecture 11 . Software Development using Templates and Iterators [Zoom] (bag4&5 in bag5-ppt.html , node2 in node2-ppt.html)	Ch. 5.3 – 5.5 Ch. 6

Mar 18 (T) Mar 20 (TH)	Lecture 12 . Stacks (code in stack-ppt.html) and Queues [Zoom] (code in queue-ppt.html) Lecture 13 . Introduction to Recursion	Ch. 7, Ch 8 Ch. 9.1, Assignment 5 [Due Apr 04]
Mar 25 (T) Mar 27 (TH)	Lecture 14 . Using and Reasoning about Recursion In-Class Exam Review 2 (Chapters 5-9) & Exam 1 Discussion	Ch. 9.2 – 9.3
Apr 01 (T) Apr 03 (TH)	Individual Exam Review 2 (Chapters 5-9) [No Class Meet] Second Exam (Chapters 5-9)	(Chapters 5-9)
Apr 08 (T) Apr 10 (TH)	Lecture 15 . Trees and Traversals [Zoom] (code in tree-ppt.html) Lecture 16 . Binary Search Trees and the Bag Class with a BST;	Ch. 10.1-10.4 Ch. 10.5, Assignment 6 [Due May 02]
Apr 15 (T) Apr 17 (TH)	Spring Recess 04/12-04/22. No Classes.	
Apr 22 (T) Apr 24 (TH)	Lecture 17 . B-Trees and Set Class (code in set.h) Exam 2 Discussions Lecture 18(I) . Heaps and Priority Queues(slides); Lecture 18(II) . Time Analysis of Trees	Ch. 11.2 Ch. 11.1, 11.3
Apr 29 (T) May 01(TH)	Lecture 19 . Serial Searching and Binary Searching Lecture 20 . Hashing	Ch. 12.1-12.3 Ch. 12.4
May 06(T) May 08 (TH)	Lecture 21 . Quadratic Sorting Lecture 22 . Recursive Sorting , Heapsort & the STL Quicksort (code in sort-code.html)	Ch. 13.1 Ch. 13.2-13.4
May 13(T) May 15 (TH)	Lecture 23 . Graph Basics; Exam Review 3 Third Exam (mainly Ch 10-13, 15)	Ch. 15
	Happy Finals and Winter Break!	

Assignments and Grading

- See syllabus above for the tentative timetable for a schedule. There will be **six programming assignments** distributed roughly every two weeks (counted 30% of your final grade). Several in-class small quizzes will add up to at least 10 % of your final grade. There will be **three in-class close-book exams** (60% of your final grade). Dates of these exams will be determined in due times and announced beforehand.
- **Policies:** For the program assignments, students may discuss ideas together. But since each student get credits for his or her submissions, all actual program code and written answers must be done individually by each student, and must not be shared. All the three exams will be close-book exams. You will need to clear state that you will neither give nor receive unauthorized assistance on any of the exams.

We fully support CUNY's policy on Academic Honesty, which states, in part:

Academic dishonesty is unacceptable and will not be tolerated. Cheating, forgery, plagiarism, and collusion in dishonest acts undermine the CUNY's educational mission and the students' personal and intellectual growth. Students are expected to bear individual responsibility for their work, to learn the rules and definitions that underlie the practice of academic integrity, and to uphold its ideals. Ignorance of the rules is not an acceptable excuse for disobeying them. Any student who attempts to compromise or devalue the academic process will be sanctioned.

Academic sanctions in this class will range from an F on an assignment to an F in this course.

- **Communications:** I would like the course to run smoothly and enjoyably. Feel free to let me know what you find good and interesting about the course. Let me know as soon as possible about the reverse. You may see me in my office during my hours or send me messages by e-mail.

Computing Facilities

The language used for this class is ANSI Standard C++ as supported by today's available compilers. Variety of PC based (both Windows and Linux) C++ compilers are available.