

Fall 2023

CS 610: Data Structures and Algorithms

Pan Xu

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Recommended Citation

Xu, Pan, "CS 610: Data Structures and Algorithms" (2023). *Computer Science Syllabi*. 328.
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CS 610 (1J1), Data Structure and Algorithms, Fall 2023

September 6, 2023

1 Basic information

Instructor: Pan Xu, GITC 4310, pxu@njit.edu. Office Hours: by appointment. Feel free to email the instructor to schedule an appointment.

Teaching Assistant (TA):

- An Hai Tran, at738@njit.edu. **Office hours: 7 PM to 8 PM on Tuesday and Friday.** Here is the link to his online Webex room: <https://njit.webex.com/meet/at738>.

The TA will hold the office hours via Webex by default. If you want to meet him face-to-face, please email the TA 24 hours before the default office hours, and then he will accommodate the request accordingly. Feel free to email TA to schedule an online appointment outside the TA's office hours.

Class schedule: Thursday, 6:00 PM to 8:50 PM. Location: **HUD JC03**. The class is delivered **Face-to-Face** and **on Zoom** simultaneously. Every student has two options to take the class: either to go to classroom to attend it physically OR take the class online by visiting the instructor's online Zoom room: <https://njit-edu.zoom.us/j/4199735447?pwd=Rk1tcUQ5L2g5aWtSa2lVWVZzSFBIodz09>.

Course overview: The course focuses on algorithm design and analysis (not implementations). The first half semester is devoted to standard topics, including sorting algorithms, dynamic programming, and basic algorithm design paradigms such as Divide and Conquer. The second half covers algorithms related to Data Sciences, such as streaming and online learning algorithms.

Prerequisite: (CS506 or CS241) and (CS505 or CS114). Students are expected to have good knowledge of discrete mathematics, probability theory, linear algebra, and calculus I and II. Also, it assumes students have basic programming skills.

Textbooks: No textbooks are required. Below is a list of useful online references:

- Algorithm Design and Analysis:
<https://www.cs.princeton.edu/~wayne/kleinberg-tardos/>
<https://courses.cs.duke.edu/fall108/cps230/Book.pdf>

2 Course content and detailed schedule

There are several components to this course as follows:

1. Instructor lectures.
2. Individual assignments: There will be expectedly four homework assignments, involving algorithm design, analysis, and implementations.
3. Midterm and final exams.
4. Class participation. Both in-person and online participations count.

Dates	Topics
W1	Introduction, Asymptotic notations and analysis
W2	Asymptotic notations and analysis (HW1 will be posted)
W3	Bubble Sort, Insertion Sort
W4	Divide and Conquer: Merge Sort
W5	Divide and Conquer: QuickSort (HW2 will be posted)
W6	Dynamic Programming
W7	Dynamic Programming
W8	Midterm
W9-11	Streaming algorithms (HW3 will be posted on W10)
W12-14	Online learning (Tues class on W12, HW4 will be posted on W13)
W15	No class.
W16	Final exam (TBD)

3 Submission and grading of assignments

Items	Grade (% of final grade)	(Posted date, Due date)
HW1	12.5	(W2,W4)
HW2	12.5	(W5,W7)
HW3	12.5	(W10, W12)
HW4	12.5	(W13, W15)
Midterm	20	W8, Friday
Final Exam	30	W16

Here are a few important notes.

- Generally, all HWs will be posted by Saturdays and due on the Sundays of the week.
- The midterm will take place in the classroom on Thursday of Week 8 (W8), **from 6 PM to 7:30 PM**, and the final is to be determined. **Both are open books and lecture notes**. Every student is expected to take the mid and final exams in person. During the exams (midterm and final), any digital devices that can potentially be connected to the Internet must be powered off, including PCs, Apple watches, Smartphones, and Tablets. Students are encouraged to bring Calculators and Conventional watches for the exams. For paper exams, if any, please

do not use pencils to write down your answers; otherwise, you are automatically deprived of the right to complain about grading after the exam.

- 20% late submission penalty will be applied if submitted within 24 hours of the deadline. Beyond that, late submission is not accepted. Unless otherwise stated, all submissions are due by 11:59 PM (EST) on the designated date.
- For all HWs, students are required to upload a PDF on Canvas by the deadline. **Note that only PDF files are accepted and all students are required to type their solutions.** It is strongly encouraged that all students should use LaTeX editors to type their solutions, including all equations and math symbols in a proper way. A very useful free online cloud-based LaTeX editor is overleaf: <https://www.overleaf.com/>.
- Grading scale: A: Top 25%; B+: Top 26-50%; B: Top 51-75%; C+/C/D/F/W: TBD.

4 Statement on academic integrity

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.