# CS-GY 6033 Design and Analysis of Algorithms CF01
Spring 2025
NYU Tandon School of Engineering
Instructor: Erin McLeish, em4447@nyu.edu

**General Information:**
This course if offered *online*, through Brightspace. All course material, lecture notes, video content, and practice problems can be found there.

**Instructor:**
Students can contact the instructor anytime by email (em4447@nyu.edu) or directly through NYU Brightspace, or by making an appointment during the online "office hours". Reaching out for help or questions on any of the practice material is strongly encouraged since this is an online course.

**Weekly Topic List:**

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| **Week 1:** | What are algorithms?<br>Run-time analysis and asymptotic growth of functions |
| **Week 2:** | Recursive algorithms and their run-time analysis<br>Hashing |
| **Week 3:** | Order Statistics<br>Heaps |
| **Week 4:** | Decision Trees and Sorting Lower Bounds<br>Counting Sort, Radix Sort, Bucket Sort |
| **Week 5:** | Quicksort |
| **Week 6:** | Exam 1: March 3rd 2025 |
| **Week 7:** | Binary Search Trees<br>Red-black trees |
| **Week 8:** | Augmented Binary Search Trees<br>Interval Trees |
| **Week 9:** | Dynamic Programming |
| **Week 10:** | Dynamic Programming |
| **Week 11:** | Exam 2: April 14th 2025 |
| **Week 12:** | Graph Algorithms: BFS, DFS<br>Topological Sort and Strongly Connected Components |
| **Week 13:** | Graph Algorithms: Minimum spanning trees<br>Single-source shortest path algorithms |
| **Week 14:** | Intro to Complexity theory |
| **Week 15:** | Review Tutorial |
| Final Exam Period | Exam 3: May 14th 2025 |

**Course Material:**
The material for the course will be provided on NYU Brightspace and will include lecture notes and videos. You may refer to the Get Started Guide for details on how the course runs online. The textbook below is an excellent reference, and most of the material can be found in this book. However, we will not cover all the material in the text below and the text book is not obligatory for the course:

*Textbook:* Introduction to Algorithms, 3rd edition, by Cormen, Leiserson, Rivest and Stein (often referred to as CLRS)

**Exams:**
There will be 3 exams, of 3 hours each. The exams consist of both a written component, and an online quiz component. The written component is run through Gradescope. Both components must be completed in order to receive credit for the exam. Exams are written **independently** without use of any external resources or collaboration.

Exam 1: March 3rd 2025
Exam 2: April 14th 2025
Exam 3: May 14th 2025

**Assignments:**
There will be 6 written homework assignments in this class. The homework is to be handed in online through the GRADESCOPE. Details on the release and due dates can be found under the"Assignments and Solutions" menu item.

**Live class sessions and participation:**
Our weekly live sessions are held on ZOOM. These meetings are essential to your learning experience. We practice taking the definitions from the course material and applying them to practice problems. Students are strongly encouraged to attend live and use the time to interact directly with others and discuss solutions. A live polling tool will run during class which allows participants to interact with the live class material. Participating in answering questions during the live classes makes up 4% of your grade.

**Office hours:**
Office hours are held online with ZOOM, and there are a total of two hours of office hours per week. The schedule is kept up to date in the calendar. If you are not available during the scheduled time, please feel free to ask to schedule on another day. Before the midterm and exam, additional office hours will be organized.

**Grading Scheme:**
Assignments: 30%
Exam 1: 22%
Exam 2: 22%
Exam 3: 22%
Live problem participation: 4%

**Final grade:**
85+ A
80 - 84: A-
75-79: B+
70-74: B
65-69: B-
60-64: C+
55-59: C
Below 55: F

**NYU School of Engineering Policies and Procedures on Academic Misconduct**

- 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.

- 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:
- Cheating: intentionally using or attempting to use unauthorised 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.
- Forgery: altering any academic document, including, but not limited to, academic records, admissions materials, or medical excuses.
- 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.
- Unauthorised collaboration: working together on work that was meant to be done individually.
- 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.

Access the entire School of Engineering Student Code of Conduct here: engineering.nyu.edu/academics/code-of-conduct. In this course, any academic misconduct results in a grade of **zero** on the submitted work

**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 (CSD) 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 Excused Absences**

Please refer to https://engineering.nyu.edu/student-life/office-student-affairs/policies for the details on acceptable reasons for absences or missing an exam. 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.

If you miss an exam or an assignments without approval from student affairs, you receive a grade of zero. For instances where you are unable to write an exam due to a valid approved reason, you are offered a make-up exam before the end of term. No assignments/exams can be skippd.

Any questions about what qualifies as an excused absence should email advocacy.tandonstudentlife@nyu.edu.

**Personal conflicts with course exams or assignments:** If you have a personal conflict with a particular exam or assignment, you *may* reach out to me at least 2 weeks before the deadline. In some instances, it may be possible to schedule your exam a day or two earlier if absolutely necessary due to travel or work. Writing an exam after the rest of the class is not possible, since the solutions are released. For any other exception to writing an exam or completing course work, you must refer to the above section on excused absences. No exam or assignment can be missed without a valid reason approved by student affairs.

**Collaboration:**

Learning from and working with your peers is highly encouraged throughout this course. You may discuss your ideas with other students (if you wish) for assignment material. However, each student must submit their *own written work*, and *no copying is permitted*. In order clarify that your work is not plagiarised, you should **write the name of any students you collaborated with** on the front page of your assignments. Exams are done entirely independently, with no collaboration. Note that sharing your work, for any purpose, outside of exams and then copying it during exam period is certainly considered academic misconduct!

**ChatGPT**

It is important that the written work required by the course is yours. You should not use ChatGPT or other AI tools for any purpose other than idea generation. Use of these tools is considered academic misconduct. Any written work submitted during the term may be followed-up by an oral interview, in order to determine that the student understands and is the author of all submitted material.

**Extra-credit:**

There is absolutely no option of extra-credit work in this class. There are a total of **nine submissions** and three oral quizzes, which is plenty of material to evaluate your performance. It is not possible to perform badly on the assignments and exams and then ask for more work to bring up your grade.