# CS 3510: Design and Analysis of Algorithms

Aaron Hillegass

Summer 2025

E-mail: hillegass@gatech.edu
Office Hours: Tuesday and Wednesday, 2-4    Lectures: Tuesday and Thursday, 10:25-12:20
Office: TBD    Class Room: TBD

## Course Description

This course provides an introduction to algorithm designs with an emphasis on the fundamental algorithmic paradigms such as greedy algorithms, divide-and-conquer, dynamic programming, graph-related algorithms, and NP-completeness. The course format is in-class lectures and the evaluation will be through written homework assignments and exams.

## Required Materials

*Algorithms* by S. Dasgupta, C. Papadimitriou, and U. Vazirani is required. https://www.amazon.com/Algorithms-Sanjoy-Dasgupta/dp/0073523402

*Algorithm Design* by J. Kleinberg and E. Tardos is optional but an excellent reference. https://www.amazon.com/Algorithm-Design-Jon-Kleinberg/dp/0321295358

## Prerequisites

- Discrete Math (CS 2050 or 2051)
- Data Structures (CS 1332)

## Topics Covered

CS 3510 will have four segments, and each segment will take roughly 3-4 weeks:

- Divide and conquer
- Dynamic programming
- Graph algorithms
- Complexity Theory

We will typically discuss problems in class that are classical examples of the topic we are covering. Students are expected to do problems using similar strategies in homeworks and exams.

# Grading

The evaluations will consist of 8 homeworks, 4 exams and one final exam. First, your grade will be weighted as follows:

- 30% Homeworks

- 10% In-class quizzes

- 15% Each exam.

Grades are assigned as follows:

- A: 90-100%

- B: 80-90%

- C: 70-80%

- D: 60-70%

- F: 0-60%

Note: The cutoffs may be adjusted, but only in the downward direction to improve letter grades. In the event of a curve, only your final overall percentage grade for the course will be curved. Individual assignments will not be curved.

# Homework Assignments

There will be eight homeworks. You will have roughly a week to complete each. Each homework will have several problems but only some problems will be graded. Homeworks will be the best source of practice for the exams. Homeworks must be submitted as a PDF document on Gradescope. The document must be typeset (LaTex, Typst, etc.) and handwritten solutions will not be accepted.

The summer semester is compressed, so we do not have the luxury of falling behind: no late homework submissions will be accepted. Homework will generally be due on Monday night.

Once grades are released, you have a week to meet with me if you feel the grade was incorrect.

The homework instructions must be followed to receive full credit. A solution must adhere to any justification, time complexity analysis, correctness, and running time requirements. Unless otherwise stated, pseudocode is not an accepted format for an algorithm solution.

The CS 3510 homework collaboration policy is as follows:

- Working together on homework is not only permitted but encouraged. You can discuss problems with fellow students, and try to develop answers together. But

  - you must disclose your collaborators on the top of your homework submission, and

  - your writeup must be your own work, and must not be significantly similar to other submissions.

- The policy would be violated, for example, if you were copying a solution you found on the internet, copy/pasting text from another student's notes or submission, copying from a shared collaboration space (collaborative whiteboard, google doc, etc.), or writing down another student's verbal explanation of their solution.

## Quizzes

Every Thursday there will be a short quiz at the start of the lecture. You must be there in person to take the quiz.

## Exams

Each exam will consist of 2-3 problems. Exams will be held during regular lecture time. The final exam will be cumulative and will be at the date, time and location indicated in the official GT calendar.

## Students with Disabilities and/or in need of Special Accommodations

Georgia Tech complies with the regulations of the Americans with Disabilities Act of 1990 and offers accommodations to students with disabilities. If you are in need of classroom or testing accommodations, please make an appointment with the Office of Disability Services to discuss the appropriate procedures. More information is available on their website.