CS 3510 Design and Analysis of Algorithms

General Information

- Course prefix: CS
- Course number: 3510
- Section: RBR
- CRN: 56258
- Instructor: Gerandy Brito
- Semester: Summer
- Academic year: 2026

Course Description

This course is an undergraduate-level course in the design and analysis of algorithms. We study techniques for the design of algorithms to solve for fundamental problems. In addition, we study computational intractability, specifically, the theory of NP-completeness. The main topics covered in the course include: dynamic programming, divide and conquer, graph algorithms, and NP-completeness.

Required Material

The course have no required material. The recommended textbook is *Algorithms* by S. Dasgupta, C. Papadimitriou, and U. Vazirani. The format of the book is irrelevant (i.e.: hardcopy, kindle edition, etc). We will post supplemental reading. Other books that are also great: *Algorithm Design* by Jon Kleinberg and Éva Tardos; *Algorithms* by Jeff Erikson, *Introduction to algorithms* by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.

Learning Outcomes

By the end of the semester, you will be able to:

- use big-O notation to describe the growth rates of runtimes of algorithms and compare them based on their theoretical performance rather than just execution time on a specific computer.

- master specific strategies for building new algorithms, using Algorithm Design Paradigms such as Divide & Conquer; Dynamic Programming, and Graph Algorithms.
- prove the correctness of your designs rigorously.
- model real-world problems as concrete problems you can solve algorithmically.
- recognize *hard* problems and understand the fundamental classes P, NP, and NP-Complete. Furthermore, you will learn how to show a given problem belongs to each of these classes.

Attendance Policy

Attendance is mandatory and tracked by the TA. Any known absences should be communicated by email to both the instructor and TA. Any unknown absences should be communicated in the same manner as soon as safely possible. When asked for documentation, please provide the event, time, and name of a person to contact to verify the event. Do not provide any personal or health information in screenshots.

Any unexcused absence will be 1% off your total grade to a maximum of 3. More than 3 unexcused absences will be 10% off your total grade.

Grading policy and weighting

- Attendance: 10%.
- In-class quizzes: 20% total.
- Homework: 20% total.
- Two exams: 25% each
- Final Exam: 20% (optional).

Your Final exam will be cumulative and may improve your final letter grade if you score higher (i.e.: if you get a C in the course and a B in the Final exam, you will be bumped to B, if you get B in the course and get an A in the final, you will be bumped to A).

Letter grades are computed according to the usual brackets: $A[90, 100]$; $B[80, 90)$; $C[70, 80)$; $D[60, 70)$; $F[0, 60)$. These brackets may change, but only to your benefit.

Use of AI tools

AI tools are an important addition to our learning spaces. We assume you will use them — but in ways that improve your own judgment instead of replacing it.

Across the course we use one simple protocol:

I. Baseline first (your own thinking before AI). You must write your own answers.

II. AI second (critique and structure, not source of reality). You may then ask AI to:

- reorganize or label notes you already wrote,
- suggest missing arguments or perspectives,
- help with phrasing, formatting, or other structures.

AI is welcome as a coach and organizer, not as a replacement for solving assignments or designing your algorithms.

Academic Integrity and Student Conduct

Students must adhere to Georgia Tech Student Code and Academic Honor Code. When uncovered, violations will be reported to the Office of Student Integrity and the assignment grade becomes 0. Violations will be reported to the Office of Student Integrity (OSI) for review.

An AI policy is in the works for this course. For now, please defer to your instructors approved use and expectations on using AI for this course. Any AI use should be meet institute policies listed on this Office of Information and Technology pageLinks to an external site. AND the Student Code of Conduct. Instructors have the ability to adjust their AI policies within courses for future assignments if issues arise by clearly announcing them in writing to the students. Instructors may not retroactively change policies for former assignments.

All submissions and projects will be monitored for compliance. For any questions or concerns, please consult the instructor.

Accommodations for Disabilities

If you have accommodations from the Office of Disability Services, please notify your instructor as soon as possible to discuss your course needs. Accommodations will take effect only after you provide the necessary documentation.

If you need accommodations but haven't set them up yet, contact Disability Services at 404-894-2563, dsinfo@gatech.edu, or visit http://disabilityservices.gatech.edu. They help coordinate reasonable accommodations for students with disabilities or temporary health conditions.

Accommodations are established through collaboration between you, your instructor, and Disability Services.