Introduction to Graduate Algorithms

General Information

- Course prefix: CS
- Course number: 6515
- Section: AO
- CRN: 89945
- Instructor: Gerandy Brito
- Semester: Fall
- Academic year: 2026

Course Description

This course is a graduate-level course in the design and analysis of algorithms. We study techniques for the design of algorithms (such as dynamic programming) and algorithms 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; randomized algorithms, including RSA cryptosystem; graph algorithms; max-flow algorithms; linear programming; and NP-completeness.

Required Material

The required textbook is *Algorithms* by S. Dasgupta, C. Papadimitriou, and U. Vazirani, and we frequently refer to it as "DPV" (initials of the authors). We also recommend the textbook *Algorithm Design* by Jon Kleinberg and Éva Tardos. The textbook chapters are mapped to the lectures via "The Reading Index", which is a separate official course document that can be found on Canvas. If a lecture is required, the associated textbook reading is also required. Course lectures are on Ed Lessons for viewing and/or download.

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.
- prove the correctness of your designs rigorously, and communicate it to a wide audience.
- model real-world problems as concrete instances 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

Students are expected to monitor and review all official communication from the course staff in a timely manner, which takes the following forms:

- Course Syllabus and schedule.
- Canvas announcements.
- Pinned Ed Discussions posts, such as (but not limited to): Discussion threads for quizzes and homework, Announcements regarding grade release, Policy details for exam proctoring and regrade requests, Expected format for assignments, Suggested practice problems.
- Email to student @gatech.edu address.
- Feedback on assignments (Gradescope and/or Canvas).

Students that need to communicate directly with the course staff for logistical issues may do so via Private posts in Ed Discussions primarily, and via email (strongly discouraged except for if the course staff has already initiated communication via email, or for extreme circumstances). Do not use Canvas Inbox, and do not use comments associated with submissions in Canvas. All deadlines and scheduled events for this class are "Eastern Time" (ET), which is the local time in Atlanta, GA, unless otherwise explicitly stated. Students are responsible for converting these to their own local time, which includes accounting for Daylight Savings transitions. Grading typically takes about two weeks for homework, and longer for exams, but this may vary.

Grading policy and weighting

The breakdown of the overall course grade is as follows:

- Homework: 0%.
- Formatting Quizzes: 1% total.
- Content Quizzes: 6% total.
- Logistic Quizzes: 3% total.
- Exams: 90% total (lowest score - 25%, middle score - 30%, highest score - 35%).

After all grades are in and all overall percentage scores for students have been computed using the weights described above, grades are assigned. The cutoffs are as follows: $A[90, 100]$; $B[80, 90)$; $C[70, 80)$; $D[60, 70)$; $F[0, 60)$. Note: 84.99% is a B. 69.99% is a C, etc. No adjustment or rounding will be applied.

Academic Integrity and Student Conduct

Plagiarism (i.e., passing off outside work as a product of one's own mind), unauthorized collaboration, cheating in any form, and sharing course materials and assignments outside of class are academic integrity violations and in violation of the GT honor code. All submissions are subject to checks to ensure academic integrity. All violations will be reported to the GT Office of Student Integrity, given a 0 on that component of the grade (OSI may impose stricter penalties for students with prior offenses). CS 6515 Introduction to Graduate Algorithms Spring 2026 Students are not permitted to share course materials, assignments, questions, solutions, content from Ed Chat or Ed Discussions, AI tools trained on course materials, or any other sensitive material outside of the class at any time. This prohibition applies to previous students, students who were enrolled this semester but subsequently dropped, prospective students, public forums, Slack/Discord/WeChat/Reddit/etc., cheating websites (Chegg/Course Hero/etc.). Students who discover illegitimately shared materials (such as a public copy of an exam) should report the issue to the course staff. For academic integrity violations, we reserve the right to enforce additional penalties (such as disqualification from extra credit opportunities) and/or drop a student's letter grade.

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.