Algorithms Honors Syllabus (Tentative)

The syllabus may change until the end of the first week of class.

Course Prefix and Number: CS 3511
Course Name: Algorithms Honors
Instructor: Jan van den Brand
Semester: Fall 2026

Instructor Information

Instructor: Jan van den Brand

Email: vdbrand at gatech edu Please always ask your questions on the discussion board rather than by email.

General Course Information

Description

Basic techniques of design and analysis of efficient algorithms for standard computational problems.

- O-notation
- Divide&Conquer
- FFT Applications
- Graph Search (BFS, DFS, Prim, Dijkstra, A*)
- Dynamic Programming
- Fine-grained complexity
- P/NP complexity
- Matching, Flow, Min-Cut
- Linear Programming

Comparison to CS 3510

This course (CS 3511) is the Honors version of the regular undergrad algorithms course (CS 3510). The pace in CS 3511 is higher and we will have fewer midterms. This allows us to cover additional more advanced topics: FFT, A*, fine-grained complexity, matching/flow/min-cut, linear programs. CS 3510 typically covers only a subset of these topics.

Please be aware that, since we have fewer midterms, each midterm will count more towards your final grade.

Course Learning Outcomes

1. Analyze Algorithm Efficiency and Correctness

Students learn to:

- Evaluate **time complexity** using asymptotic analysis (Big-O, recurrences).
- Prove **correctness** and **efficiency** of algorithms.

2. Formulate and Solve Computational Problems

Throughout the course, students practice:

- Modeling computational problems in terms of well-known algorithmic frameworks.
- Designing pseudocode-level solutions adhering to correctness and complexity constraints.

3. Reason About Complexity and Hardness

Students should be able to:

- Identify NP-complete problems
- Use reductions to show hardness
- Understand limits of efficient computation

4. Communicate Algorithmic Ideas Clearly

The course emphasizes:

- Writing formal arguments (proofs, correctness, complexity)
- Producing clear pseudocode or structured algorithmic solutions

Required Course Materials

There are no required books.

Grading Policy:

Final grade is the average of

- 33.3% Midterm 1
- 33.3% Midterm 2

- 33.3% Homework (23.3% Final Project, 10% Problem Sets)
- There is an optional Final Exam that you can use to replace one of the Midterm Exams.

Grade thresholds are A - 90%, B - 80%, C - 70%, D - 60%. The thresholds may change in the future, but they can only change in your favor.

Description of Graded Components

- Exams (midterms and final exam) are 1h in length. The midterms take place during the usual lecture time and in the usual lecture hall. The day/time for the final exam will be listed in Georgia Tech's Final Exam Matrix. Tentative Midterm dates: around 10/12 (after fall break) and 11/18 (before thanksgiving break).
- The Final Exam is a selection from all covered topics.
- The Final Project is to come up with an interesting algorithmic question and study it. The project can be interpreted as designing a "leet-code" or competitive programming exercise: Give (i) an algorithmic question, (ii) a correct and efficient solution together with proof/analysis, (iii) anticipated incorrect algorithms and edge-cases, test cases that distinguish correct, incorrect/too slow algorithms.
- The Final Project is due on the last day of class (around 11/30).
- Weekly homework problem sets are submitted via Gradescope.

Course Policies

Attendance and/or Participation

Midterms/exams are in-person. There is no mandatory attendance for the lectures, but students are fully responsible for taking or obtaining notes and ensuring they are aware of all material covered in class.

Collaboration, Group Work, and Use of Generative AI

- You are encouraged to collaborate and work in groups, but you must write your own solutions. You must write the names of students you worked with on your homework.
- You may look up reference material online and in textbooks to help with your homework but you may not copy, or paraphrase answers to homework questions.
- You can use AI like ChatGPT to help you write LaTeX code, formatting etc., and you can use it as a "personal TA", e.g., ask it how to approach a problem or ask it to explain a concept from class. However, you must not ask it for solutions to the homework problems.

The policy would be violated, for example, if you were copying a solution you found on the internet, copy/pasting text from another student, or just paraphrasing it/shuffling words around.

It is easy to not violate this policy: Take your own notes when working in a group, when reading relevant material, or discussing things with a TA. Later you write a solution based on your own understanding.

The main purpose of the homework is for you to learn the material. If you explain to another student your idea for solving some problem, then you both improve your understanding. That's great! But if they just copy your text, then they don't learn anything. We don't want that.

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

- Late homework and final project submissions will not be accepted.
- Of the 3 exams (Midterm 1, Midterm 2, Final Exam), the lowest exam grade is dropped. Thus, the final exam is essentially optional if you attended the midterms. The final exam is there to cover the case that you missed one of the midterms, but you are also free to take it if you did not miss a midterm.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and

cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Campus Resources for Students

Undergraduate Student Academic Success Resources:

Academic Support: Academic Success and Advising (a unit in the Office of Undergraduate Education & Student Success) provides free support for your courses. Students can attend scheduled supplemental review (PLUS) sessions, stop by Drop-In Tutoring, or schedule a one-on-one appointment through Knack. To explore what options work best for you, please visit us online at success.gatech.edu/tutoring, email us at tutoring@gatech.edu, or come see us at Clough Undergraduate Learning Commons, Suite 283.

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being (student-resource-guide (gatech.edu)