Course Syllabus

1 - Introduction

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.

Note: the syllabus and course schedule are subject to change. Any changes to the syllabus and/or course schedule after the semester begins will be announced to the students on Canvas or Ed Discussions.

1.1 - Textbook

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 J. Kleinberg and E. 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.

1.2 - Lectures

Course lectures are on Ed Lessons for viewing and/or download.

2 - Grade Policies

The breakdown of the overall course grade is as follows:
  i.   Homework: 0%
  ii.   Formatting Quizzes: 1%
  iii. Content Quizzes: 6%
  iv.   Logistic Quizzes: 3%.
  v.   Exams: 90% (three total, dynamic weights)
        a. Lowest score exam – 25%
        b. Middle score exam – 30%
        c. Highest score exam – 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: [85%, 100%]   B: [70%, 85%)   C: [50%, 70%)

D: [40%, 50%)   F: [0%, 40%)

Note: 84.99% is a B. 69.99% is a C. 49.99% is a D. 39.99% is an F. No adjustment or rounding will be applied.

3 - Class Communications and Logistics

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:
    - 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.

3.1 - Ed Discussions and Ed Chat

Ed Discussions is the primary forum for collaborating with classmates and soliciting help from the course staff. As this class typically has 1000+ students, the following policies aim to make the forum more manageable for everyone:

- Follow the course Collaboration policies (section 6 in the Syllabus) at all times.
- Post questions to relevant threads instead of creating new threads.
- Post homework and course content questions publicly in Ed Discussions. Posting anonymously is permitted.
- Use private posts only for personal logistical issues. Course staff do not offer private one-on-one support working through the course material and will not review potential solutions in advance.

- Before posting a question, attempt to find the answer by reviewing already available official communication.
- Use Ctrl+F, the limited search feature, sort and filter tools, stars, etc. to help manage locating important information.
- Do not use thread categories tagged "Staff Use Only"; these are reserved for the course staff releasing official material.

Course staff will also limitedly support real-time communication with students via Ed Chat. Ed Chat is an official platform in that it is an acceptable place for students to discuss course material, similar to Ed Discussions. However, it is also optional for students and does not replace Ed Discussions. Ed Chat will not be used as the primary means for communicating important announcements or information with students.

We expect Ed Discussions and Ed Chat to be places where students can hold constructive discussions, solicit advice and input from the course community, and where students can provide support to peers. Students are expected to contribute in a constructive fashion; exhibiting patience, understanding, tolerance and respect. NOTE that full participation in this forum is reserved for course members who behave professionally and responsibly. Failure to do so may result in the administrators of the course taking action to limit access, and referral for discipline consistent with Georgia Tech's policies.

The following are considered serious violations of policy: Harassment; Threats; Personal attacks based on ethnic group, race, age, religion, gender, sexual orientation, or disability status; Posts with inflammatory or vulgar content/language or use of symbols to represent vulgar language; Posts that are slanderous or libelous; Spam postings (either continued posting of repetitive content, or series of posts without attempting critical thought, or repeated instances of comments not relevant to original posts). Any posts unrelated to the course should be submitted for approval via a private post to the instructors.

Respectfully disagreeing with someone, including the instructors, in a constructive, respectful, well-reasoned manner is permitted. However, it is not appropriate to use this forum as an outlet for anger or frustration.

3.2 - Gradescope

All assignments will be graded on Gradescope. We will import student information into Gradescope which will create a Gradescope account for each student. Students are required to use this Gradescope account with the name and GTID that matches exactly with Canvas (otherwise the systems won't sync). The default due date/time for all homeworks, exams and projects is Mondays at 8am ET. Students are expected to observe the posted deadlines, plan accordingly, and to check their submissions after upload to ensure correct submission.

4 - Assignments and Deliverables

4.1 - Homework

There will be homework assignments throughout the semester, consisting of written and/or coding components. The homework assignments are designed to be learning opportunities and practice for the exams. Grades and feedback on homework assignments are for student edification <u>only</u> and do not contribute to a student's grade. Homework will be posted on Canvas and announced in Ed Discussions with an associated discussion thread. Each assignment will be available for a week and due at 8am ET on the following Monday, unless announced otherwise. There will be no extensions except for approved emergency situations or disability accommodations, which must be coordinated with course staff.

Written homework assignments will have a set of *practice* problems (ungraded) and *graded* problems, clearly marked on each homework. We will release solutions for the practice problems mid-week (typically Thursday) and will discuss solutions to the previous week's graded problem in office hours. There may also be *suggested* problems posted separately from homework assignments – these will not have provided solutions and are simply provided as extra practice. Written homework submissions are uploaded to Gradescope, and should be typed (not hand written) and properly tagged via Gradescope's submission features.

Coding homework assignments will use Python to implement algorithm concepts. Solutions will not be provided for these.

For all homework assignments, students may:
- use official course materials without citation (lectures, textbook, posts on Ed Discussions or Ed Chat)
- collaborate with other **<u>currently enrolled</u>** students, up to and including sharing entire solutions and test cases
- consult any other references (including online and solutions manuals)
- use AI tools to help with composition of a solution
- reuse their old solutions from a previous iteration of the class without citation

Sources and collaborators must be cited at the end of solutions.

All submitted work must represent the student's own effort.

Students may **not** share any assignments or materials, or make them accessible in any way, with individuals that are not currently enrolled in CS 6515. This includes students that were formerly enrolled but have since withdrawn, students from previous semesters, and private tutors.

4.2 - Quizzes

There will be several **Format and Content quizzes** during the semester. Format quizzes are designed to show the important elements of a complete, correct, and efficient solution for a particular type of problem. Content quizzes are designed to help students test and reinforce their understanding of course concepts and mimic autograded questions on exams. These quizzes are mandatory, graded, and will be delivered on Canvas. Details for number of attempts, scoring details, etc. will be posted on Ed Discussions in a separate thread for each quiz.

Students may:
- use official course materials (textbook, lectures, supplemental posts on Ed Discussions from the course staff)
- use personally generated notes
- use the associated Ed Discussions thread to ask clarifying questions

Students may not:
- discuss the questions or contents of a quiz *while the quiz is open for submission*
- share the contents, questions, or scope of a quiz with anyone not currently enrolled in the course

Please see the schedule and Canvas for official due dates.

Logistics Quizzes are designed to ensure students are aware of our policies and expectations, and are as follows:
- *Course Communication & Logistics Quiz*, which details how the class is run (communication methods, how to submit assignments, what is and is not in scope, etc.)
- *Academic Integrity Quiz,* which reviews our expectations in terms of collaboration and plagiarism
- *Onboarding Exam* , which provides students a chance to test their environment to see if it meets our unique Exam Proctoring requirements, and ensures students understand our unique proctoring requirements.
  - A separate, ungraded Mock Exam will be made available after the Onboarding Exam deadline passes to allow students to test their environments for the rest of the semester.

These are mandatory and are together worth 3% of the final grade. There are unlimited attempts at each logistics quiz (with incorrect answers marked) until they are due. Please see the schedule and Canvas for official due dates.

4.3 - Exams

Exams are administered on Canvas through Honorlock. Exams are closed book, no additional devices (no calculators, phones, etc. or other applications) and no additional references (no notes or books). Please see the schedule and Canvas for official exam windows and due dates. Students are free to take an exam at any time within the bounds of its exam window. There are no extensions under any circumstances; emergency situations are handled case-by-case with course staff with alternate methods.

Full proctoring requirements will be posted on Ed Discussions, but here are some things we suggest reviewing now:

- Review important Honorlock technical requirements. (https://honorlock.kb.help/minimum-system-requirements/)
  - Students must have a broadband internet connection.
  - Students must have a webcam and microphone.
  - Honorlock does not support Linux OS, Virtual Machines, tablets, or smartphones.
  - Honorlock requires installation of the Honorlock Chrome extension with Google Chrome.
- Students must have a secure, private location to take an exam.
- Students will be asked to provide a picture I.D. as part of the exam process.
- Students will be required to perform a thorough room scan of their test environment.

We will release more details about the proctoring of the exams the week of the first exam, including a mock exam to mimic the technical environment, and to provide familiarity with the exact format seen on exams.

For proctoring violations, we reserve the right to enforce penalties and/or disqualify the exam.

For poor proctoring, we reserve the right to enforce stricter proctoring standards for all future exams (to include future semesters in which this course is attempted).

During an exam window, all discussion of CS 6515 content is prohibited. This includes discussion in study groups, with a private tutor, with former students, etc. Failure to comply with this policy can be considered an academic integrity violation. This applies to the entire exam window, and not just the specific time block during which a student is performing an exam attempt.

4.4- Regrade policy

Regrades are an important mechanism to ensure students receive the grade they deserve with manually graded assignments. A regrade request must be made "in good faith" with the intention of correcting a mistake made in grading and/or requesting further clarification and feedback on the application of a penalty, and comply with the process detailed in Ed. Note that a regrade request can result in an overall lower grade in the event another, larger error is discovered during a regrade or as a consequence of abusing the regrade request process.

5 - Academic Integrity Policy

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 (https://policylibrary.gatech.edu/student-life/academic-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).

Students are <u>not</u> permitted to share course materials, assignments, questions, solutions, content from Ed Chat or Ed Discussions, 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.

6 - Collaboration Policy

Authorized student collaboration is highly encouraged, and historically an early indicator of whether a student will succeed in the course.

We define "Public" in this class to refer to any space, online or physical, accessible to someone who is not currently enrolled in the course. Public discussions of course concepts (example: how the RSA algorithm works, or whether P=NP), and/or publicly and legitimately available materials (such as the textbook and the lectures), are permitted **as long as** they are not directly related to an "open" assignment. (Example: publicly discussing a problem in the textbook that happens to be the graded homework problem for the week.)

Permitted <u>Non-public</u> Collaboration					
	Homework	Quiz (while quiz is open)	Quiz (after the quiz is closed)	Exam (during exam window)	Exam (after exam closes)
Discussion of useful resources that might help	Yes	Yes	Yes	**No**	Yes
Discussion of questions and solutions	Yes	**No**	Yes	**No**	Yes
Sharing solutions	Yes	**No**	Yes	**No**	Yes
General discussion regarding CS 6515 topics	Yes	Yes	Yes	**No**	Yes
Use of AI tools	Yes	Yes	Yes	**No**	Yes

While collaboration rules for homework are purposefully lenient, we strongly recommend that all students work out the details of their own solutions and write them up separately, as this will provide the greatest learning opportunity (and most useful feedback) to students. Collaboration does not remove the

requirement for students to appropriately cite and give credit – failure to do so can be considered to be plagiarism.

Study groups are encouraged but not required. There is no limit to the number of study groups a student is member of. Study groups are capped at 30 members per group. Students are free to organize their study group's logistics as desired so long as it complies with all course policies and the GaTech Honor Code. A study group that consists only of currently enrolled students is considered "private." A study group containing members that have withdrawn from the class, former students, private tutors, etc. is considered "public."

Special note for repeat students: Students that have previously enrolled in CS 6515 are prohibited from sharing any semester-specific questions, solutions, or materials from a previous semester with anyone that was not part of that offering of the course. Repeat students may refer to those materials for their own personal studies.

7 - Students with Disabilities and/or in need of Special Accommodations

Students with accommodations (such as extra exam time, bathroom breaks, etc.) need to inform us as soon as possible, and provide us with the detailed accommodation approval letter from the GT Office of Disability Services. Note that we cannot provide accommodations retroactively.

8 - Waitlists, Registration, Permits, etc.

The instructional team cannot perform any actions regarding class registration. We cannot issue permits, remove students from waitlists, etc. For guidelines on such matters, please consult https://math.gatech.edu/permits-and-waitlists .