CS-2050: Introduction to Discrete Mathematics

Summer 2026

Instructor Office Hours

Ronnie's OH: TBD

Course Description

This course helps students develop an understanding of the basic primitives and paradigms of the mathematical theory of computation. Students will learn to write formal proofs, understand logic, and explore various forms of induction and recursion. The course covers foundational areas of mathematics to support computation, including:

- Developing clear logical reasoning
- Understanding simple encryption techniques
- Writing regular expressions
- Designing computational models

Course Objectives

By the end of this course, students will develop a rigorous foundation in discrete mathematics as it applies to computer science. Students will learn to reason formally using propositional and predicate logic, including propositional equivalences, quantified expressions, and rules of inference. They will master key proof techniques such as direct proof, contradiction, contraposition, counterexample, and mathematical induction (including strong induction), and apply these methods to recursively defined sets, functions, sequences, and algorithms. The course will strengthen students' understanding of sets, functions, summations, and sequences, and introduce fundamental algorithmic concepts including searching, sorting, growth rates of functions, and asymptotic analysis using Big-O notation. Students will analyze algorithms using common design paradigms such as divide-and-conquer, greedy, brute-force, and recursive approaches. Additional topics include number theory (divisibility, modular arithmetic, Euclid's algorithm, and primality), basic cryptographic principles such as RSA, combinatorics and probability (counting techniques, permutations, combinations, and the pigeonhole principle), and models of computation including deterministic finite automata and regular expressions. Throughout the course, students will apply these mathematical tools and techniques to problems and scenarios relevant to computer science.

Textbooks and Required Materials

ZyBooks
We will use **ZyBooks** as the main resource for weekly readings and participation quizzes, which count toward your grade.

To access ZyBooks:

1. Click any ZyBooks assignment link in **Canvas**.
    - This ensures your Canvas account is directly linked to ZyBooks.
    - **Do not** create a separate ZyBooks account, as this will cause syncing issues.
2. Subscribe to the book (cost: **$69**).

Recommended Textbook
Discrete Mathematics and Its Applications by Kenneth Rosen, 8th Edition.

- Lectures will follow this textbook, and you are expected to read the corresponding sections.
- The format of the book (hardcopy, Kindle, etc.) is irrelevant.
- A **solution guide** for odd-numbered problems is available (optional but helpful).
- While this book is not required for homework assignments, I highly recommend utilizing it for additional support.

ISBN:

- ISBN-10: **125967651X**
- ISBN-13: **9781259676512**

Format and Additional Criteria for Completing the Course

Quizzes

- Quizzes will be implemented on *ZyBooks* to account for participation, and you are responsible for completing them.
- In addition, there will be a syllabus quiz on Canvas to make sure students are acquainted with the information on this page. This quiz will also count under the Zybooks category. There will be unlimited attempts, but you must pass with 100% accuracy for completion.

Recitations

- Recitations are not mandatory but are extremely helpful for success in CS2050.
- Staff will **not repeat** information presented in recitations if you could not attend.

Communication

- All class information will be shared via *Canvas Announcements* and during lecture.

- *Canvas Modules* will host lecture content and will be updated twice weekly (within 24 hours after each class).
    - The most recent modules will be at the top of the list.

Exams

There will be **three exams**, all **weighted equally**. **Exams 1–2** are midterms held during class (90 minutes each). **Exam 3** is held during the final exam period and is **not fully comprehensive if only taking part A**. Exams cannot be taken asynchronously.

Exam 3 consists of **two parts**(per GT Final Exam Policy #10). **Part A** is **required** and covers material since Exam 3. Part A will last 80 minutes which is allowed per GT Final Exam Policy #10. **Part B** is **comprehensive over Exams 1–2 and will last 80 minutes**. Part B is **optional.**

Students who received a low score on Exam 1 or Exam 2 **may choose to take Part B**, but are not required. If taken to address a low score, the **Part B score will be averaged with the lowest exam score only if it improves the grade**; otherwise, the original exam score will remain unchanged.

Homework

- Homework will be assigned on *Canvas* and submitted on *Gradescope*.
- Only part of the homework will be graded, but the specific questions chosen for grading will not be revealed.
- You may type or hand-write your homework, but it must be **legible** and easy to read.
    - Illegible submissions may result in penalties.

Ed Discussion

- *Ed Discussion* is the class forum for asking questions related to lectures.
    - General posts should remain **public** so that other students can benefit or help you more quickly.
    - Private posts are only for questions directly related to your homework solution.
- **Do not** use the forum to ask for direct solutions to homework problems.

Grading Breakdown

- **Participation Quizzes on ZyBooks + Syllabus Quiz**: 4%
- **Homework**: 12%
- **Exams**: 84% (4 exams, each weighted equally at 28%)

Letter Grades

Letter grades are assigned based on the following brackets:

- **A**: 90–100

- **B**: 80–89.99
- **C**: 70–79.99
- **D**: 60–69.99
- **F**: 0–59.99

These brackets **will not change**. There will be **no rounding or curving** of grades. Requests for grade adjustments, such as curving, rounding, bonus work, or any similar requests, will result in a **1-point deduction** from your final grade per infraction.

ZyBooks Participation Quizzes

- **ZyBooks** serves as the textbook for this course.
- Weekly participation quizzes will be released on Mondays and will cover the week's cumulative material.
- **Due Date**: Quizzes must be completed by **Friday** each week.
- **Late Submissions**:
  - Late submissions are allowed without penalty until **Monday** (3 days after the due date).
  - No further extensions will be granted beyond this window.
- **Preparation**: Attending and watching lectures should adequately prepare you for these quizzes.
- **Note**: No quiz scores will be dropped.

Homework Policies

- Homework will be posted on **Canvas** and submitted on **Gradescope**.
- You are encouraged to type your homework using **LaTeX** Links to an external site.. If handwriting, ensure your work is **clear and legible**; illegible or improperly formatted work will incur penalties.

  Examples of improper formatting that will be penalized:

  - Illegible handwritten submissions
  - Improperly rotated pages
  - Homeworks submitted as "megapages," i.e. all questions and answers on one long page rather than separate pages (this is common with students who export from tablets)
  - Mismatched pages in Gradescope

- Homeworks will be partially graded, and we will not reveal which questions are graded.
  - Although the homeworks are partially graded, there will be a penalty for not completing the homework. For example, if Questions 3, 6, and 7 are graded, and you happened to complete only those three questions, you will not get full credit for the homework, even if you did them correctly.

Regrade Policy:

- Regrade requests must be submitted on **Gradescope** within **one week** of grade release.
- Requests must include a valid argument. Frivolous requests (examples below) will not be addressed:
    - *"I feel I deserve more points."*
    - *"I think the grading was too harsh."*
    - *"Please check my solution again."*
    - *"I don't know where I made a mistake. Can you check and tell me?"*
- **Note**: Entire questions will be regraded, which may result in losing additional points.

Life Happens Policy

We recognize that unforeseen circumstances can arise. To address these, we have established a policy for handling issues such as unexcused absences, including those with notes from the Dean of Students stating, "It is up to the discretion of the instructor" or similar language. Our approach is as follows:

- The **lowest homework grade** will be dropped (does not apply to ZyBooks).
- Two Late submissions are allowed for up to **2 days**:
    - After the 2nd late submission, all further late submissions will automatically receive a 0
- An assignment is considered **late** even if submitted a second past the deadline. Technical difficulties will **not** be considered for exemptions. Submit early to avoid issues.

Please understand that these are your only options for dealing with sickness and other hardships. Use them wisely.

Institute-Approved Absences and Homework Policy
In accordance with Institute Approved Absence (IAA) guidelines, accommodations are required only for coursework missed during scheduled class time. Assignments that are available for completion or submission outside of class—particularly those accessible prior to a planned absence—are expected to be completed by the original deadline. In such cases, no extensions or alternative arrangements will be provided, as students already have a reasonable opportunity to complete the work.

Academic Honesty and Collaboration Policy

- Collaboration on homework is allowed, but you must write your **own solutions**.
- You must list the names of any students you collaborated with on each homework submission.
- **Copying** solutions from peers, AI or other external sources is considered **plagiarism** and will be penalized per the GT Code of Conduct.

Exams

Exam Policy:

- Exams will be conducted **in class**.
- **Personal calculators, notes, and collaboration** are **not allowed** on exams.
- Regrade requests for exams:
    - Submit requests on **Gradescope** within **one week** of grade release.
    - For the **final exam**, the regrade window is **24 hours**.
    - The same regrade rules as homework apply.

Final Exam:

- Held during the designated final exam time listed on the living schedule
- **Weighted equally** with the other three exams
- **Not fully comprehensive**
- Consists of **two 80-minute parts** (per GT Final Exam Policy #10.):
    - **Part A (Required):**
        - Covers material since Exam 2
    - **Part B (Optional for most):**
        - **Comprehensive over Exams 1–2**
        - Optional for students who choose to address a low score on Exams 1–3
        - If taken to address a low score, the **Part B score will be averaged with the lowest exam score**, not used as a full replacement
        - Administered immediately following Part A during the final exam block

Attendance Policy

Lecture Policy: While attendance in lectures is not monitored, it is highly encouraged as lectures will not be recorded. However, notes will be taken and shared using OneNote.

Exam Absence Policy:

- Submit absentee documentation with any necessary documentation using the link provided at the top of the course page.
- All absences must be verified through the **Dean of Students**.
- Valid excuses include institutionally approved events or documented emergencies. Examples of invalid excuses:
    - Waking up late, bad traffic, headaches, etc.
- **Institutional Events**: Submit documentation **before the exam**.
- **Religious Observances**: Per GT Policy, you must notify the instructor within the first 2 weeks of the semester.
- **Voting:** While officially excused, we will strive not to schedule exams on voting day.

Makeup Exams:

- Approved makeup exams will be administered within 1 week of the original exam date. Unexcused absences will not be given a makeup.

Professionalism and Student Conduct

Professional behavior is expected at all times—both in-person and online. This includes respectful communication with peers, teaching assistants, and instructors, whether via email, forums, meetings, or class discussions.

Clear, courteous, and constructive dialogue fosters a positive learning environment for everyone. Inappropriate tone, hostile language, or disrespect directed toward any instructional staff or fellow student—particularly concerning assignments—will not be tolerated.

Any student who communicates disrespectfully about an assignment may receive a zero on that assignment. This applies regardless of the assignment's point value or context.

Artificial Intelligence Policy

We treat AI-based assistance, such as ChatGPT, the same way we treat collaboration with other people: you are welcome to talk about your ideas and work with other people in the class and with AI-based assistants.

However, **all work you submit must be your own**. **You should never include in your submissions anything that you did not write directly in your assignment.**

Including anything you did not write in your assignment will be treated as an academic misconduct case. If you are unsure where the line is between collaborating with AI and copying AI, we recommend the following heuristics:

Heuristic 1: Never hit "Copy" within your conversation with an AI assistant. You can copy your own work into your own conversation but do not copy anything from the conversation back into your assignment. Instead, use your interaction with the AI assistant as a learning experience.

Heuristic 2: Do not have your assignment and the AI agent open at the same time. Similar to the above, use your conversation with the AI as a learning experience, then close the interaction down, open your assignment, and let your assignment reflect your revised knowledge.

This heuristic includes avoiding using AI directly integrated into your composition environment: just as you should not let a classmate write your solutions, you should also avoid using tools that directly add content to your submission.

Deviating from these heuristics does not automatically qualify as academic misconduct; however, following these heuristics essentially guarantees your collaboration will not cross the line into misconduct.

Accessibility

Students with disabilities: your access to this course is extremely important to us. The institute has policies regarding disability accommodation, which are administered through the Office of Disability Services Links to an external site.. Please request your accommodation letter as early

in the semester as possible so we can arrange your approved academic accommodation as we cannot retroactively apply accommodations.

Mental Health Resources

As a student, you may experience a range of issues that can cause barriers to learning. These might include strained relationships, anxiety, high levels of stress, feeling down, or loss of motivation. The Center for Assessment, Referral, and Education (CARE) may help you find the best resource to address issues you might experience over the semester. You can learn more about free mental health services available on campus by accessing their website https://care.gatech.edu.. If you are experiencing a crisis, call 404-894-3498. Help is available 24 hours a day, seven days a week.