Georgia State University — CSC 4520 / 6520

Course Syllabus for CSC 4520 / 6520: *Design & Analysis of Algorithms*

Fall 2024

Time

5:30pm–7:15pm on Tuesdays and Thursdays

Room

Langdale Hall, Room 229

Instructor

Name: Murray Patterson
Email: mpatterson30@gsu.edu
Office: 1 Park Place, Room 948E
Zoom: `https://gsu-edu.zoom.us/my/mpatterson30`

Office Hours

- Fridays from 1pm–3pm in my office or via Google Meet `https://meet.google.com/obq-wxfs-wdw` (I will also be online during this time)
- After class: I will remain in the classroom
- By appointment: please discuss with me or send me an email to arrange a time

Teaching Assistants (TAs)

Name: Sravani Arugunta
Email: sarugunta1@student.gsu.edu

Prerequisites

CSC 2510 and CSC 2720 with a grade of C or higher

Reference Materials *(not required)*

- Introduction to Algorithms. Cormen, Leiserson, Rivest, and Stein (Fourth Edition, MIT Press, 2022)

  ISBN: 9780262046305

- Problem Solving with Algorithms and Data Structures Using Python. Miller and Ranum (Second Edition, Franklin, Beedle & Associates, 2011)

  ISBN: 9781590282571

- Other online resources will be provided as the course proceeds

Course Content

Georgia State University iCollege — `https://icollege.gsu.edu`

Course Overview

Welcome to CSC 4520 / 6520 at Georgia State University! The course starts with a revision of fundamental data structures including arrays, linked lists, stacks, queues, hash tables, heaps, trees, and sets. Then we will move from basic programming techniques and algorithms that operate on these data structures (like searching, sorting, hashing, etc.) to more advanced (like divide-and-conquer, randomization, dynamic programming, greedy algorithms, etc.). Topics include computational complexity analysis; sorting; hashing; divide-and-conquer, dynamic programming; greedy algorithms; graph algorithms; shortest paths, network flow; matrix calculations.

Course Structure

- **Lecture** — Classes will be conducted in a traditional lecture format.
- **Homework** — Assignments will build on the lecture content.
- **Discussions** — Opportunities to share questions about key concepts, homework assignments, and more.

Exams

There will be a midterm and a final exam in this course. The exams will involve questions, problems, or programming assignments which cover lectures, homework assignments, and readings.

Grade Scale

Grade	Point Equivalent
A+	≥ 97
A	≥ 90
B+	≥ 87
B	≥ 80
C+	≥ 77
C	≥ 70
D	≥ 60
F	< 60

Grading (*subject to change*)

- Homework Assignments (50%)

- Midterm Exam (20%)
- Final Exam (30%)

Course Schedule (*subject to change*)

	Topic
Week 1	Syllabus and introduction: data structures and time complexity
Week 2	Implementing data structures
Week 3	Sorting algorithms and master theorem
Week 4	Hashing and non-comparison sorting algorithms
Week 5	Algorithmic design: greedy, divide and conquer, intro to dynamic programming
Week 6	Dynamic programming and midterm preparation
Week 7	Dynamic programming: devising a good subproblem, and release of midterm
Week 8	Dynamic programming: adding states, and on polynomial algorithms
Week 9	More difficult dynamic programming problems
Week 10	Graph algorithms
Week 11	Shortest path in a graph
Week 12	Computational complexity
Week 13	Randomized algorithms
Week 14	Incremental improvement and preparation for final exam
Finals	Final Exam

Make-up Policy

Exams

There are no make-up exams unless the student missed the exam due to a pre-arranged excused absence *e.g.*, participation in a GSU sports event, observance of a religious holiday (see `https://belonging.gsu.edu/religious-observances/`), or an emergency, etc. In all cases, documentation needs to be provided before or after, *e.g.*, a note from the coach, a mention of the religious holiday, or a slip from the doctor, etc. — only official excuses will be accepted. **Any uncoordinated, unexcused missed exam will result in a score of zero for that exam**.

Homework

Each homework assignment is due at the beginning of class on the due date.

Academic Honesty Policy

In academics, intellectual property is extremely important. This is one reason we hold students to the tenets of the Academic Honesty Policy — other topics related to student conduct are available at `https://codeofconduct.gsu.edu/`. But intellectual property goes beyond that when it comes to the materials created by your instructor and the publisher of your textbook. Your instructor has spent a great deal of time and energy developing materials for this course, and the publisher holds a copyright to all materials associated with the textbook. Please be aware that the GSU community takes this very seriously.

It is for this reason that GSU has a special policy regarding copyright, found at `https://cetl.gsu.edu/services/instructional-support/constructing-a-syllabus/`. This policy implies that the selling,

sharing, publishing, presenting, or distributing of instructor-prepared course lecture notes, videos, audio recordings, or any other instructor-produced materials from any course for any commercial purpose is strictly prohibited unless explicit written permission is granted in advance by the course instructor (note that this includes homework assignments, labs, exams or their solutions). This includes posting any such materials on websites such as Chegg, Course Hero, OneClass, Stuvia, StuDocu and other similar sites, or using them as prompts in AI tools such as ChatGPT. Unauthorized sale or commercial distribution of such material is a violation of the instructor's intellectual property and the privacy rights of students attending the class, and is prohibited.

Sharing of any materials from the textbook, such as questions from publisher provided quizzes, is likewise prohibited.

Course Evaluations

Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take the time to fill out the online course evaluation.

Extended Absences

For students, the Dean of Students' Office will continue to provide faculty with notifications when students file **Professor Notification of Absences (PNAs)**. This notification indicates that the Dean of Students office has reviewed the documentation related to a student's medical circumstances. For more information about this, and how to submit such a notification, see `https://deanofstudents.gsu.edu/student-assistance/#professor`.

Students with Disabilities

Students who wish to request accommodation for a disability may do so by registering with the Access and Accommodation Center. Students may only be accommodated upon issuance by the Access and Accommodation Center of a signed **Accommodation Plan** and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.

Basic Needs Statement

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable us to provide resources that we may possess. The Embark program at GSU provides resources for students facing homelessness and Panther's Pantry provides resources for students facing food insecurity.

Disclaimer

The course syllabus provides a general plan for the course — deviations may be necessary.