Data Structures and Algorithms

Curriculum and Instructions

Course Objective

Introduce students to a wide array of data structures, mechanisms of analysis, along with when and how to use them. This will involve some heavy implementation work. Students will:

1. Learn about the wide variety of data structures available and how they can completely change how we approach problems, with the aim of being able to recognize when and how to apply this knowledge.
2. Design and analyze nontrivial data structures and see related algorithms.
3. Solve recurrences and structure proofs. Pre-requisite: Discrete Mathematics, ICS.

Prerequisites

Discrete Mathematics and ICS

Coverage

1. Basic data structures (linear lists, arrays, stacks, queues), analysis
2. Trees
3. Hash-tables and related constructions
4. Skiplists
5. Self-organizing lists
6. Graphs
7. Strings
8. Integers
9. Geometry, and structures optimized for the memory hierarchy; possibly some succinct structures
10. Abstract data types. Primitive data types; some background on word RAM. Elementary principles of software engineering, as well as some algorithms intrinsically related to the data structures taught in class.

Attendance

Not mandatory. However, since it is a fundamental course in CS which requires serious training and rigor, class attendance is encouraged for proper understanding of the concepts.

Grading

1. Assignments (take home, to be done in groups of 2): 25%
2. Attendance: 5% (above 75% attendance to fetch full)
3. In class short quizzes: 15%
4. Midterm exam: 30%
5. Final exam: 30%

References

Additional reference books include Goodrich and Tamassia (Algorithm Design and Applications), Aho and Ullman (Data Structures and Algorithms), and Aaron M. Tenenbaum (Data Structures using C)

Note: In special circumstances, extra quizzes/oral exams might be conducted for a few students at the discretion of the faculty member. Please also note that the curriculum/instructions/grading scheme presented in this document is subject to change at the discretion of the faculty member. Please follow Google Classroom closely for updates.