

Data Structures and Algorithms

Lecture 0: Course Introduction



Course Information

■ Course Website

- ◆ We will upload our course materials to iSpace.

■ Teaching Staff

- ◆ Instructor: Xucheng MENG (蒙许成)
- ◆ –Office: T3-502-R15
 - Email: xuchengmeng@uic.edu.cn
 - Office Hours: Mon 14:00-17:00 & Wed 10:00-12:00
 - TA: Ms. Yue LIANG
 - Email: laurenlyue@uic.edu.cn
 - Office Hours: TBD

Tutorials and Labs

- 1 hour per week
- Time and venue: TBD
- Lab attendance is required

Grading

- Assignments
 - ◆ Written assignments (15%)
 - ◆ Coding assignments (15%)
- Quiz (10%)
- Midterm Test (20%)
- Examination
 - ◆ Final examination (40%)
- Note: Two sections will be graded together!

Textbook

■ Textbook

- ◆ Data Structures and Algorithm Analysis in **C++**, by Mark Allen Weiss
 - Published by Addison-Wesley, 2007
 - Latest version = 3rd Edition
 - Source codes are available online

■ Reference

- ◆ Introduction to Algorithms
- ◆ One of the most classic algorithm and data structure books.
- ◆ Third Edition, The MIT Press, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein

Leetcode

- LeetCode - The World's Leading Online Programming Learning Platform.
- The key to become a successful software engineer.
- Most of the problems are the real interview questions of world leading software companies, e.g. Google, Facebook, etc.
- A good channel to sharpen your programming skills (data structure, algorithm, coding).
- Suggestion: practice according to categories we learned in class (see below).
- Hint: Quiz/Exam will include Leetcode style question.

The screenshot displays the LeetCode website interface. At the top, there's a navigation bar with links like 'LeetCode', 'Topics', 'Problems', 'Mock', 'Contact', 'Articles', 'Discuss', and 'Store'. Below this is an announcement banner. The main content area is divided into two columns. The left column shows a list of problems under the 'Algorithms' category, with columns for '#', 'Title', 'Solution', and 'Acceptance'. The right column features a 'Learn the Basics' section with a 'Recursion I' card, a 'Your Progress' section with a pie chart, and a 'Top Hits' section with various question lists. A sidebar on the right contains a search bar and a list of categories: System Design, OOD Design, Operating System, Recursion, Database, and Shell. The 'Recursion' category is highlighted with a red box. Below the categories, there's a 'Filter Topics' section with a list of topics: Binary Indexed Tree, Segment Tree, Binary Search Tree, Recursion, Graphs, Memoization, Dynamic Programming, and Reservoir Sampling. The 'Recursion' and 'Dynamic Programming' categories are highlighted with red boxes.

#	Title	Solution	Acceptance
1	Two Sum		40.2%
2	Add Two Numbers		30.4%
3	Longest Substring Without Repeating Characters		35.1%
4	Median of Two Sorted Arrays		25.3%
5	Longest Palindromic Substring		26.4%
6	ZigZag Conversion		30.4%
7	Reverse Integer		25.1%
8	String to Integer (atoi)		14.6%
9	Palindrome Number		41.8%
10	Regular Expression Matching		24.8%
11	Container With Most Water		40.1%
12	Integer to Roman		68.6%
13	Roman to Integer		61.4%
14	Longest Common Prefix		32.9%
15	3Sum		23.2%
16	3Sum Closest		33.9%
17	Letter Combinations of a Phone Number		40.1%
18	4Sum		23.2%

Plagiarism Policy

- Assignments: Copying from others, or allowing others to copy from you, both grades of you will be 0
- Quiz and Midterm exam : -200%
- Final: an automatic FAIL

You are encouraged to collaborate in study groups.
But, you cannot copy or slightly change other students' solutions or codes. **Honor Matters!**

Course Overview

- A fundamental **computer science** (CS) course
 - ◆ Essential for programming
 - ◆ Essential for advanced CS courses
- A challenging course, which needs
 - ◆ Mathematical and Logical thinking
 - ◆ Programming skills

Course Prerequisite

- Programming
 - ◆ Need to know C++
 - ◆ Visual Studio or other PC programming environment
 - ◆ Good programming skills
 - ◆ Translate pseudo-codes into codes
 - ◆ Quick review of C++ in the 1st week
- Basic mathematical skills
 - ◆ Solving recursive equations (递归方程), manipulation of symbols, etc.
- Computer architecture
 - ◆ Pointers (指针), storage, memory access, etc.

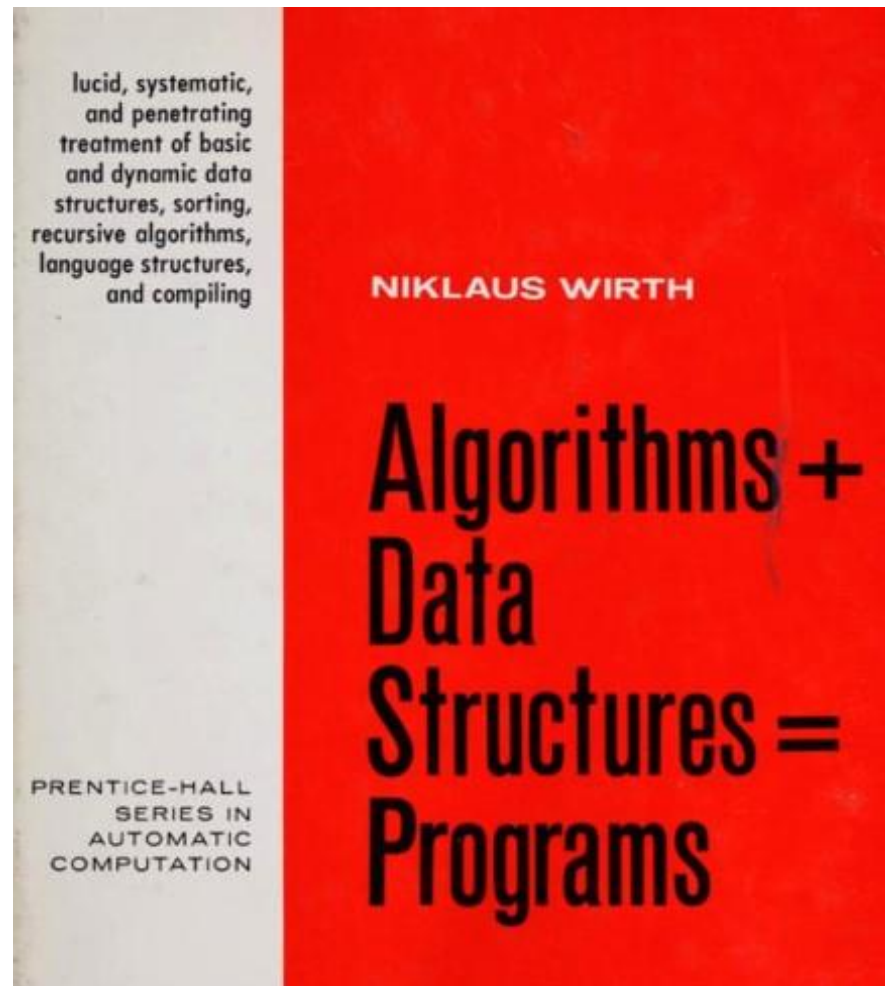
Topics Covered in this Course

- Algorithm Analysis
 - ◆ Mathematical Background, Big-O, Running time Calculation
- Abstract Data Type (ADT)
 - ◆ Lists, Stacks and Queues
- Trees
 - ◆ Tree Traversals, Binary Trees and Binary Search Trees, AVL Trees and B-Trees
- Priority Queues (Heaps)
 - ◆ Binary heaps, Applications of Priority Queues, d-Heaps
- Sorting Algorithms
 - ◆ Insertion Sort, Heap Sort, Shell Sort, Merge Sort, Quick Sort, Bucket Sort, External Sort
- Graph Algorithms
 - ◆ Topological Sort, Shortest-Path Algorithms, Minimum-Span Tree

Overall Goals of the Course

- From programmer to architect
- Learn to solve problems
- Algorithms and Programming go hand in hand
- Learn to analyze your solutions

The importance of Data Structure



1976, Niklaus Wirth (1934-), received the [Turing Award](#) in 1984