

Introduction to Algorithms

Topic 0 : Course Information

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University of Science and Technology of China (USTC)

Fall Semester 2025

- ▶ **Lecture Time and Room**

- ▶ Friday 9:45AM-12:10AM

- ▶ GT-B112

- ▶ **Credit Hours:** 60 (Theory) + 30 (Experiment), 3.5 points

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▶ Text Book and Recommended References

- ▶ **Textbook:** 《Introduction to Algorithms》, Thomas. H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.
中文翻译版: 《算法导论》, 机械工业出版社. Thomas. H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein 著. 潘金贵, 顾铁成, 李成法, 叶懋 译
- ▶ Main Reference: 《Algorithm Design》影印版 (中文名: 算法设计), 清华大学出版社. Jon Kleinberg, Eva Tardos 著

- ▶ **Fundamental course for every subject in CS.**
 - ▶ Introduction to the design, behavior, and analysis of computer algorithms.
 - ▶ Searching, sorting, and combinatorial algorithms are emphasized.
 - ▶ Worst case and average bounds on time and space usage.
 - ▶ Besides, practicing efficient implementation of algorithms.
- ▶ **Prerequisite courses**
 - ▶ 程序设计，数据结构，高等数学，离散数学

Course Outline

- ▶ Basic Concepts
- ▶ Asymptotic Mark and Recursive Equation
- ▶ Comparison Based Sorting Algorithms
 - ▶ insertion sort, shellsort, quicksort, etc.
- ▶ Sorting in Linear Time
 - ▶ counting sort, radix sort, bucket sort and order statistics
- ▶ Advanced Data Structure
 - ▶ binary search trees, red-black trees, and etc.
- ▶ Basic Algorithm Design Strategies
 - ▶ dynamic programming, greedy methods, divide-and-conquer
- ▶ Graph Algorithms
 - ▶ DFS, BFS, minimum spanning tree, shortest path
- ▶ String Matching Algorithms
 - ▶ brute-force, KMP, SHIFT-OR, BM, BMH, QS, KR
- ▶ NP-Completeness and Approximation Algorithm

► Assignments and Experiments (25%)

► Assignments: 10 homeworks, assigned almost every week with **firm** deadlines

► 6 Experiments:

1. 排序算法及性能对比等

Tentative Date: 2025.9.27

2. 高级数据结构: 红黑树、数据结构扩张、二项堆等

Tentative Date: 2025.10.11

3. 动态规划: LCS、矩阵链乘、最优二分检索树等

Tentative Date: 2025.10.25

4. 贪心算法: 区间覆盖、K 进制编码、活动安排、背包问题等

Tentative Date: 2025.11.8

5. 图论算法: 所有点对最短路径、强连通分量等

Tentative Date: 2025.11.22

6. 串匹配算法: KMP、BM、KR、Quick Search 等

Tentative Date: 2025.12.6

- ▶ Assignments and Experiments (25%)
- ▶ Midterm (20%) (Tentative Date: 2025.10.22)
- ▶ Final Examination (40%) (in the examination week)
- ▶ Class Attendance and Activity (15%)
 - ▶ Attendance and in-class quiz (10%).
 - ▶ Active students (e.g., interacting with instructors) will win the other 5 points.

Grading Policy

- ▶ The instructor reserves the right to make adjustments to these weights based on his a posteriori evaluation of the relative difficulty of the exams and homework.
- ▶ Each problem will be graded 80% for correctness and 20% for style and clarity.
- ▶ **Final Grade** $W = \frac{W_1 + W_2}{2}$, W_1 is the final weighted score (Assignments and Experiments + Attendance + Midterm + Final) and $W_2 = 100 \times \frac{W_1}{AverageTopFive}$. Here *AverageTopFive* is the average of W_1 of the best five students in the class. For example, if your $W_1 = 70$, and $AverageTopFive = 90$, then your $W = \frac{70 + 70 \times 100 / 90}{2} \simeq 73.89$.
- ▶ **No plagiarism will be tolerated**

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- ▶ Weekly Recitation: 15:35 – 16:35 on every Tuesday (Tentative, to be discussed with students)
- ▶ Weekly Office Hours: every TA has some office hours (to be discussed with TAs), students can stop by during office hours.

- ▶ 活动目的：为同学们提供与企业交流的平台，了解算法在企业的实际需求，理实交融；鼓励学生基于实际应用总结问题，并通过课题、大创等科研形式，在学校老师和企业工程师的帮助下，提出并解决科研问题；
- ▶ 具体安排：期中考试后，基于自愿报名，挑选全班约 10% 的同学，参访知名企业及其算法实验室（如 MSRA, 华为、阿里、腾讯、讯飞等）；
- ▶ 中国科大教学研究类重点项目“算法实践与算法教学质量提升”支持。

- ▶ Course Homepage:

<https://2025-ustc-algorithm.github.io>

All handouts and announcements will be posted on the QQ group and the course homepage.

- ▶ course information
- ▶ course schedule and slides
- ▶ assignments, exams and answers.

- ▶ Online Judge:

Url: https://hydro.ac/d/USTC_Algorithm_2025/

- ▶ Your experiments submitted and tested here.

- ▶ bb platform <https://www.bb.ustc.edu.cn/>

- ▶ Upload your assignments here
- ▶ Writing assignments with Latex (highly recommended), MS Word, or just taking a photo of your answers on a paper.

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Wish You Enjoy This Course!