Introduction to Algorithms

Topic 0 : Course Information

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School of Computer Science and Technology
University of Science and Technology of China (USTC)

Fall Semester 2020

- **Instructors**
  - Prof. Xiang-Yang Li (科技实验楼 113, xiangyangli@ustc.edu.cn)
  - Dr. Haisheng Tan (科技实验楼 103, hstan@ustc.edu.cn)

Course Information

- **Instructors**
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  - Dr. Haisheng Tan (科技实验楼 103, hstan@ustc.edu.cn)
- **Lecture Time and Room**
  - Tuesday 3:55PM-5:30PM, Thursday 3:55PM-5:30PM
  - Room 3C201
- **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, Glifford 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, Glifford 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, amd 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

Course Load and Grading Policy

- ▸ Course Load
  - ▸ Assignments and Experiments (25%)
    - ▸ Assignments: assigned every week with firm deadlines
    - ▸ 6 Experiments:

      排序算法及性能对比
      Tentative Date: 2020.10.15
      高级数据结构：红黑树、数据结构扩张、二项堆
      Tentative Date: 2020.11.10
      动态规划法：LCS、矩阵链乘、最优二分检索树
      Tentative Date: 2020.11.24
      贪心算法：区间覆盖、K 进制编码、活动按排、背包问题
      Tentative Date: 2020.12.1
      图论算法：所有点对最短路径、强连通分量
      Tentative Date: 2020.12.24
      串匹配算法：KMP、BM、KR、Quick Search
      Tentative Date: 2020.12.31

Course Load and Grading Policy

- Course Load
  - Assignments and Experiments (25%)
  - Mideterm (20%) (Tentative Date: 2020.10.29)
  - 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.

Course Load and Grading Policy

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  - ▶ Final Examination (40%) (in the examination week)
  - ▶ Class Attendance and Activity (15%)
- ▶ 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 (Assginments 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 $W = \frac{70 + 70*100/90}{2} \simeq 73.89$.
  - ▶ **No plagiarism will be tolerated**

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  - Class Attendance and Activity (15%)
- Grading Policy
- TAs
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  - 杨越佳, yangyj99@mail.ustc.edu.cn
  - 李梓宁, lizining@hnu.edu.cn
  - Weekly Recitation: 15：00 – 16:00 on every Saturday. Location (a classroom) to be announced.

Course Links

- Course Homepage: **http://202.38.86.171**
  All handouts and announcements will be posted there.
  - course information
  - course schedule and slides
  - assignments, exams and answers.
- Online Judge Website: **https://202.38.86.171**
  - Your programs submitted and tested here.
  - online discussion platform
- FTP Server: **ftp://202.38.86.171**
  - Upload your assignments here
  - Writing assignments with Latex (highly recommended), MS Word, or just taking a photo of your answers on a paper.

Wish You Enjoy This Course!