



CS411 Applied Algorithm

Instructor Information	<p>Quan Li Home Institution: ShanghaiTech University Email: liquan@shanghaitech.edu.cn Office Hours: Determined by Instructor</p>		
Term	<p>June 27, 2022 - July 22, 2022</p>	Credits	4 units
Class Hours	Monday through Friday, 120 mins per teaching day		
Discussion Sessions	2.5 hours each week, conducted by teaching assistant(s)		
Total Contact Hours	66 contact hours (1 contact hour = 45 mins, 3000 mins in total)		
Required Texts (with ISBN)	<p>1. Algorithm Design, Jon Kleinberg and Eva Tardos. Pearson, ISBN: 9780321295354 . Introduction to Algorithms (3rd Edition), Thomas H. Cormen/Charles E. Leiserson/Ronald L. Rivest / Clifford Stein</p>		
Prerequisite	<p>Introduction to Programming Algorithms and Data Structures Probability and Statistics</p>		



Course Overview

Applied Algorithm is a required course for both undergraduate and graduate students majoring in computer science. It teaches advanced algorithm design and analysis skills. The contents include: the basis of algorithm analysis, greedy method, divide-and-conquer method, dynamic programming, network flow, computational complexity category, amortized analysis, approximation algorithm, randomized algorithm, and local search.

Course Goals

1. Knowledge cognitive ability: master basic ideas and main skills of algorithm design and master the skills of analyzing and proving all kinds of algorithms.
2. Able to apply the learned knowledge to solve specific problems; understand the category of algorithm complexity and other theoretical knowledge, and the analysis of specific problems.
3. Comprehensive quality and ability: able to understand engineering professional ethics and norms, with scientific spirit and basic literacy of engineers.

Personal Strategic Plan

The knowledge points of this course are mainly taught in class, covering the main methods and techniques of algorithm design, the basic ideas and skills of algorithm analysis, and the important conclusions and methods of algorithm and complexity theory, so as to guide students to master algorithm design and analysis comprehensively and deeply.

Homework, and Exams

There will be two homework assignments, which are tailored towards helping students master the key concepts covered in class. There will be one mid-term and one final exam. Test questions will be covered both in the textbook and in class.

Academic Integrity

This course attaches great importance to academic integrity, and plagiarism and cheating are strictly prohibited.



Grading Policy

Mid-term Exam	35%
Homework	30%
Final Exam	35%

Grading Scale

Number grade	Letter grade	GPA
90-100	A	4.0
85-89	A-	3.7
80-84	B+	3.3
75-79	B	3.0
70-74	B-	2.7
67-69	C+	2.3
65-66	C	2.0
62-64	C-	1.7
60-61	D	1.0
≤59	F (Failure)	0



Class Schedule

Date	Lecture
Day 1	Course Overview, Computational Tractability, Asymptotic Analysis
Day 2	Greedy Algorithm
Day 3	Divide and Conquer
Day 4	Dynamic Programming
Day 5	Dynamic Programming, Network Flow, <i>HW1 Release</i>
Day 6	Network Flow
Day 7	Network Flow
Day 8	NP and Computational Intractability, <i>HW1 Due</i>
Day 9	NP and Computational Intractability, <i>HW1 Review</i>
Day 10	Mid-term Exam
Day 11	Mid-term Review, NP and Computational Intractability
Day 12	NP and Computational Intractability
Day 13	Extending Tractability (FPT), Local Search
Day 14	Extending Tractability (FPT), Local Search, Amortized Analysis
Day 15	Amortized Analysis, Randomized Algorithm, <i>HW2 Release</i>
Day 16	Randomized Algorithm
Day 17	Approximation Algorithm
Day 18	Approximation Algorithm, <i>HW2 Due</i>
Day 19	Final Review, <i>HW2 Review</i>
Day 20	Final Exam