

B403 Introduction to Algorithm Design and Analysis

§1 Introduction

Qin Zhang

Brief self-introduction:

My name: Qin[Chin] Zhang

I've worked on theory/algorithms for 16+ years;

My main interest is *Algorithms for Big Data*, and
Theoretical Foundations of Machine Learning

I've published extensively in all top conferences/journals in
theory/algorithms

I write experimental papers too, and have published in all
top databases, data mining and machine learning venues

Today's agenda

1. A brief introduction of the course
2. A touch-base quiz (40 mins)
3. A briefly discussion on the solutions.
(if time allows)

Course topics

1 : **Introduction**

- Big-O notations, common running times

2 : **Graph Algorithms**

- BFS, DFS, DAG, topological sorting

3 : **Greedy Algorithms**

- Interval scheduling, MST, shortest path

4 : **Divide & Conquer**

- Mergesort, counting inversions, closest pair

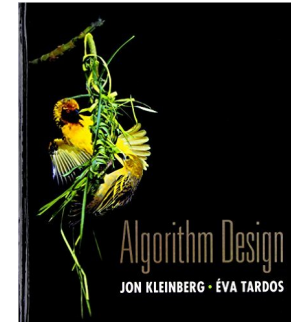
5 : **Dynamic Programming**

- Weighted interval scheduling, subset-sum, edit distance



Textbooks

- Required textbook
 - **Algorithm Design**
by J. Kleinberg and E. Tardos
Pearson Education



The book comes with slides:

<http://www.cs.princeton.edu/~wayne/kleinberg-tardos/>
(or Google “Algorithm Design slides”)

We will NOT use these slides in this course though

Resources

■ Course website

`http://homes.sice.indiana.edu/qzhangcs/B403-23-spring-algorithm/`

- Various information (e.g., office hours, exam dates)

■ Canvas

1. Posting homework assignments and solutions;
homework collection
2. Announcements
3. Course lecture notes

Instructors

- Instructor: Qin Zhang
Email: qzhangcs@indiana.edu
Office hours: Wednesday 1-2pm @ Luddy 3044
- AI: Nikolai Karpov
Email: nkarpov@iu.edu
Office hour: Thursday, 3-4pm, @ Luddy 2052.

Grading

- Assignments 30%

5 equal-weight written assignments

The answers should be submitted via Canvas.

Please typeset in your favorite software.

No extensions or late homework will be granted

(unless emergencies; medical emergencies need doctor's note).

- Exams 70%: Mid-term (30%), Final (40%).
- **The final grades will be curved**

More practice

Practice is very important to master algorithm design.

1. Subsections in the textbook that we do not cover in class
2. Solved exercises in the textbook
3. Other exercises in the textbook (do not appear in homeworks).
Feel free to ask us questions if you meet any difficulty
(email us the question first so that we can get prepared).
4. Any other questions that you can find online
 - there are tons of algorithm design questions online.Again, feel free to ask us questions if you meet any difficulty.

Prerequisites

Participants must have a background in **math analysis**, **discrete math** and **data structures**, and have taken

1. C241 Discrete Structures for Computer Science
2. C343 Data Structures

https://iu.instructure.com/courses/1560867/pages/schedule?module_item_id=14976212

3. MATH-M 216 "Analytic Geometry and Calculus II" (or MATH-M 212 CALCULUS II)

Thank you!

Questions?

Next: a touch-base quiz