Design of Algorithm: Introduction

Mohammad Javad Dousti

Changelog

❑ Rev. 1
  ➢ Fixed the link for the skype group.

❑ Rev. 2
  ➢ Added Prof. Ghodsi's book to the list of readings in slide 6.

❑ Rev. 3
  ➢ Finalized exam 1 and exam 2 dates in slide 11.

Instructor Info

❑ Mohammad Javad Dousti

❑ **Office:** ECE Building 1; Room 23 (2nd floor; no in-person meeting during the pandemic; sorry!)

❑ **Office Hours:** Wednesdays 8:00am – 10:00am through Skype (ID: mjdousti)

➤ Please inform me a day in advance before calling me.

❑ **Email:** mjdousti@ut.ac.ir (I'll try my best to respond within 1 business day)

Class Info

❑ When: Saturdays & Mondays 9:00am – 10:30am

❑ Where: Online

❑ Class Web Page:

➢ E-Learn: http://elearn.ut.ac.ir

➢ Discussion group:

   o Telegram group: https://t.me/+-Otc__MDslM3NTNh

   o Skype group: https://join.skype.com/NUPpNORClbqp

➢ Quera group for uploading computer assignments
https://quera.org/overview/add_to_course/course/10567 (use <mark>DA14002</mark> as password)

   o Make sure to use your *full name* and *correct student ID*.

Readings

❑ **Main Textbook**:

➢ Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "*Introduction to algorithms*," MIT press, 2009 (the CLRS book.)
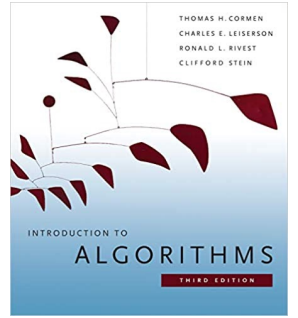
❑ Recommended Readings:

➢ U. Manber "*Introduction to algorithms: a creative approach*" Addison-Wesley, 1989.

➢ J. Kleinberg and É. Tardos, "*Algorithm design*," Pearson Education, 2006.

➢ S. Dasgupta, C. Papadimitriou, and U. Vazirani, "*Algorithms*," McGraw-Hill Higher Education, 2008.

➢ J. Erickson, "*Algorithms*," 2019.

Readings (cont'd)
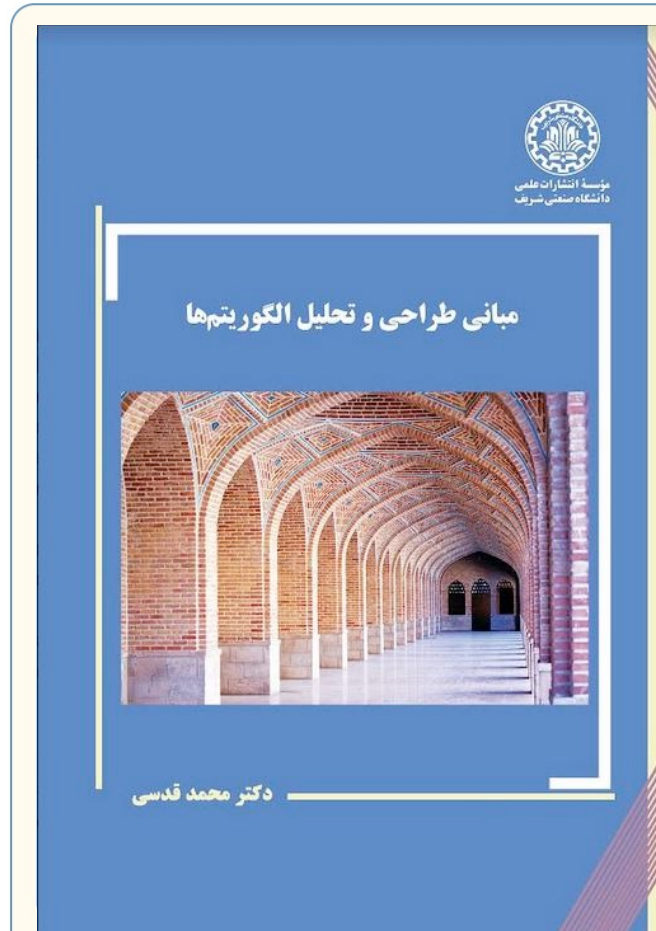
عنوان: مبانی طراحی و تحلیل الگوریتم ها

نویسنده: دکتر محمد قدسی

نوبت چاپ: اول

سال چاپ: ۱۴۰۰

قطع: وزیری

تعداد صفحات: ۳۶۰

ناشر: مؤسسه انتشارات علمی دانشگاه صنعتی شریف

توضیحات: ارسال از ۹ اسفند ۱۴۰۰

قیمت: ۱۲۰۰۰۰ تومان

افزودن به سبد خرید

دریافت فایل pdf همراه کتاب

Book page: http://sharif.edu/~ghodsi/?page=da-alg-book
Purchase link: https://book.sharif.ir/user/getDocInfo/442

Course Objectives

❑ This course is the keystone of computer science & engineering majors.

❑ You'll get familiar with important algorithms and learn how to solve algorithmic problems efficiently.

❑ This course makes you stand out from someone who learns programming on their own.

❑ You'll need concepts of this course to be able to pass *standardized interviews*, especially, those for ==tech giants (i.e., Amazon, Apple, Google, Facebook, and Microsoft==).

❑ I strongly encourage you to take a look at the "==***Cracking the Coding Interview***==" book. It's an extremely popular book to prepare candidates for tech giants interviews. The book simply teaches how to solve algorithmic problems. That's exactly what you'll learn in-depth in this very course.
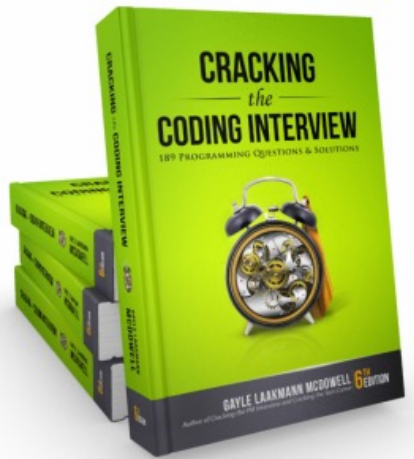
Prerequisites

❑ Data Structures and Algorithms

❑ Engineering Statistics & Probability

❑ Passion & dedication

Course Content

❑ In this course, we'll walk you through 6 major topics:

  ➢ Divide and conquer

  ➢ Dynamic programming

  ➢ Greedy algorithms

  ➢ Graph algorithms (shortest paths)

  ➢ Maximum flow network

  ➢ NP-completeness and branch & bound

Grading

- Analytical homework (HW): 25% (5 pts)
- Computer assignment (CA): 25% (5pts)
- Three exams: 3 x 15% (3 x 3pts)
- *Up to* six pop quizzes: 6 x 2.5% (6 x 0.5pts)
- Late HW/CA will be penalized at the rate of 10% per day or fraction thereof for the first two days. After that (two days), no late HW/CA will be accepted.

Exams

❑ Exam dates:
  ➢ Exam 1 date: **Thursday 1401/1/18 (۱۸ فروردین ۱۴۰۰); 10am-12pm**
  ➢ Exam 2 date: **Thursday 1401/2/22 (۲۲ اردیبهشت ۱۴۰۱); 10am-12pm**
  ➢ Final exam time: **1401/4/5 afternoon (صبح ۵ تیر ۱۴۰۱)**

Course Policies

❑ You are responsible for all assigned readings and information presented in the class, including due dates, assignments, exams and so forth.

  ➢ Make sure to always download latest copies of course slides. I may revise them over time with more up-to-date info or fix errors over time. I use a versioning system by attaching `_rev#` postfix to slide names and add a `changelog` slide to the very beginning of each slide deck.

❑ You are expected to attend *all live* class meetings. I won't take notes of absentees but you will be responsible for anything said verbally or done in the class. Also, you need to attend classes in order to take quizzes.

❑ You are expected to attend live classes (including exam sessions) with proper university dress code. I may ask all or some of you to turn your webcam on, especially, during exam sessions.

  ➢ Make sure to have a reliable Internet connection and preferably a backup plan for exam sessions.

  ➢ Also make sure to have a reliable computer with a backup power supply (e.g., fully charged battery) in case of power outage.

Teaching Assistants

❑ Chief TA:

➢ Mohammad Hadi Hojjat (m.hadi.hojjat@gmail.com)

#	Subject	Homework	Computer Assignment
1	**Divide & Conquer**	Hesam Asadzadeh (hesam.as.sa.as@gmail.com)	Borna Tavassoli (borna.tavassoli@gmail.com)
2	**Dynamic Programming**	Amirhossein Abaskohi (amirhossein.abaskohi@gmail.com)	Moein Karami (moein2000n@gmail.com)
3	**Greedy Algorithms**	Mohammad Taha Fakharian (taha.fakharian@gmail.com)	Amir Mohammad Khosravi (amirmohammadkhsv@gmail.com)
4	**Graph Algorithms**	Adib Rezaei (adibrezaeish@gmail.com)	Ali Abbasi (aliabbasi806@gmail.com)
5	**Network Flow**	Mohammad Farahi (farahim.1379@gmail.com)	Sara RezaeiManesh (Sara.rezaeimanesh2000@gmail.com)
6	**NP and B&B**	Majid Deliri (majiddl.2099@gmail.com)	-

Educational Fairness

❑ We have a <mark>*zero-tolerance policy*</mark> for any form of <mark>*plagiarism*</mark> in this course.

> ➢ Plagiarism: The practice of taking someone else's work or ideas and passing them off as one's own.
>> o Needless to say, this includes copying solutions or codes from the Internet.

> ➢ First and foremost, note that plagiarism makes the course unfair to others.

> ➢ You'll pickup a BAD habit which will hunt you down at some point in your life.

> ➢ For the first time, you'll get a zero in the related work and for the second time, you will fail the course with the lowest grade. All parties involved in plagiarism will be punished.

> ➢ I really discourage it in any form. It isn't really worth it. You have been warned! ☠️

Educational Fairness (cont'd)

❑ Extreme situations (COVID-19 related):

➢ We are going through unprecedented times. If you need any extra accommodations, feel free to raise your concern during my office hours or through email.

➢ I'll do my best to provide reasonable accommodation as long as the concern is raised in a timely manner.

o Do **NOT** wait until the end of semester or when you get a bad grade. In this case, you probably won't get any accommodation.

Course Schedule*

Week	Saturday	Monday	Thursday	Assignments
1	Introduction	Video upload – Divide & Conquer		HW1, CA1 – Divide & Conquer out
2	Online class - Divide & Conquer			
3	Online class - Divide & Conquer	Video upload - Dynamic Programming		HW1, CA1 due HW2, CA2 - Dynamic Programming out
4	Online class - Dynamic Programming			
5	Online class - Dynamic Programming			
6	Online class - Dynamic Programming		**Midterm 1 - (Divide & conquer and dynamic programming)**	HW2, CA2 due
7	Solving exam 1 Video upload - Greedy Algorithms			HW3, CA3 - Greedy Algorithms out
8	Online class - Greedy Algorithms	Video upload - Graph Algorithms		
9	Online class - Graph Algorithms			HW3, CA3 due HW4, CA4 - Graph Algorithms out
10	Online class - Graph Algorithms			
11	Online class - Graph Algorithms		**Midterm 2 (Greedy and graph algorithms)**	HW4, CA4 due
12	Solving exam 2 Video upload - Network Flow			HW5, CA5 - Network Flow out
13	Online class - Network Flow			
14	Online class - Network Flow	Video upload – NP and B&B		HW5, CA5 due HW6 – NP out
15	Online class - NP			
16	Online class - NP			HW6 due
	صبح ۵ تیر ۱۴۰۱			**Final Exam (Flow and NP and B&B)**

* Please refer to the course schedule for exact detailed dates.