

# CS 583 - Analysis of Algorithms

Spring 2018

## Course Description

This course focuses on a thorough examination of several well-known techniques used for the design and analysis of algorithms. Topics include analyzing sequential and parallel algorithmic strategies such as greedy methods, divide and conquer strategies, dynamic programming, search and traversal techniques, and approximation algorithms; and introduction into the theory of NP-completeness.

## Instructor

Dmitri Kaznachev, Ph.D.  
Adjunct Professor, Computer Science Department  
Senior Director, Trading Technology, Freddie Mac  
[dkaznach@gmu.edu](mailto:dkaznach@gmu.edu)  
Office hours: by appointment

## Graduate Teaching Assistant

TBD

## Class

David King Jr. Hall, Room 2053  
Tuesday, 7:20 PM - 10:00 PM (see exceptions below)

## Prerequisites

- CS 310 - Data Structures
- CS 330 - Formal Methods and Models
- MATH 125 - Discrete Mathematics I

## Text Book

- Introduction to Algorithms by T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, 3rd Edition (2009)

## Grading

- 6 Homeworks (5 points each) - 30%
- Midterm (30 points) - 30%
- Final (40 points) - 40%
- Bonus points:
  - Class participation - 3
  - Midterm exam - 3
  - Final exam - 4

100+ points: A+; [90, 100): A; [85, 90): B+; [80, 85): B; [75, 80): B-; [70, 75): C; [0, 70): F

## Tentative Schedule

Date	Topic	Test
Jan 23	Introduction, insertion sort; chapters 1, 2.1, 2.2.	HW1 assigned
Jan 30	Asymptotic notation; chapters 2.2, 3.1, 3.2.	HW1 due
Feb 6	Divide and conquer strategy, merge sort; chapters 2.3.1, 2.3.2, 4.3, 4.4, 4.5.	HW2 assigned
Feb 13	Quicksort, probabilistic analysis, quicksort; chapter 7, appendix C.	HW2 due
Feb 20	Order statistics; chapters 5.2, 9.	HW3 assigned
Feb 27	Data structures: binary search trees; chapter 12	HW3 due
Mar 6	Midterm Exam	Midterm
Mar 13	Spring Break - NO CLASS	
Mar 20	Dynamic programming; chapters 15.3, 15.4	HW4 assigned
Mar 27	Greedy algorithms; chapter 16.3	HW4 due
Apr 3	Amortized analysis; chapters 17.1, 17.2, 17.3, 17.4	HW5 assigned
Apr 10	Graph algorithms, BFS; chapters 22.1, 22.2.	HW5 due
Apr 17	Graph algorithms, DFS; chapter 22.3.	
Apr 24	Graph algorithms, shortest paths; chapters 24	HW6 assigned

May 1	Introduction to NP-Completeness; chapter 34	HW6 due
May 8	Reading Day - NO CLASS (office hours & optional topic: Hypergraph Algorithms)	
May 15	Final Exam - 7:30 PM	Final

## Policies

Please note that all coursework should be done independently. Plagiarizing the homework and cheating on the exam will be penalized; see Honor Code at

<http://cs.gmu.edu/resources/honor-code>.

## Communication

This term we will be using Piazza for class discussion. The system is highly catered to getting you help fast and efficiently from classmates, the TA, and myself. Rather than emailing questions to the teaching staff, I encourage you to post your questions on Piazza. If you have any problems or feedback for the developers, email [team@piazza.com](mailto:team@piazza.com).

Find our class page at: TBD