CS 5112: Design and Analysis of Algorithms
Syllabus

Summer 2020

Instructor: Behzad Parviz
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ET A312

Office Hours: By prior appointments

Course Description: Design of complex algorithms. Algorithms for solving frequently occurring problems in computer applications. Computationally intractable problems., heuristics and partial solutions. Optimization techniques. Analysis of algorithms for specific problems of interest.

Course Goals: At the end of the course, students are able to

1. Analyze the correctness and computational complexity of computer algorithms.
2. Design (specify and implement) efficient advanced Data Structures.
3. Know advanced design techniques and their nontrivial application to classic problems of searching, sorting, graph optimization and combinatorial optimization.

These course goals contribute to the success of **Student Learning Outcomes 1.a, 1.d, 1.e,**

Prerequisites: CS 3112

Textbook(s): Introduction to Algorithms (3rd Edition). By: Cormen, Leiserson, Rivest and Stein. MIT

Chapters Covered: (1 - 12), 9, 15(15.1-15.4), 16(16.1-16.3) , 22, 23, 24(24.1-24.4), 25, 29(29.1-29.3)

Reference(s): Algorithms by Johnsonbaugh and Schaefer
Michael T. Goodrich, Roberto Tamassia. Data Structures and Algorithms in Java (5th edition

Topics:

1. Review of the CS312 material.
2. Analysis of the Correctness and of the Computational Complexity of Computer Algorithms.
3. Advanced Data Structures: Binary Search Trees, Balanced Trees, Heaps, Indirect Heaps, Priority Queues, Dictionaries, Hash Tables, Union-Find.
4. Searching and Sorting Algorithms.
5. Design Techniques: Divide and Conquer, Greedy and Dynamic Programming.
6. Probabilistic Analysis and Randomized Algorithms.
7. Medians and Order Statistics
8. Graph Algorithms.
9. Linear Programming
10. Advanced Design and Analysis Techniques: Dynamic Programing, Greedy Algorithn

Presentations: One Chapter is presented in each class. Each Chapter will be presented twice.

Quizzes: There is a quiz after each Chapter Presentation.

Grading Policy: Presentation: 30%, Quizzes: 25%, attendances: 5% (-1% per absence), and Final: 40%

A	Score 90 - 100
B	Score 80 - 89
C	Score 70 - 79
D	Score 60 - 69
F	Score below 60

Academic Integrity: Cheating will not be tolerated. Cheating on any assignment or exam will be taken seriously. All parties involved will receive a grade of F for the course and be reported to the appropriate university authority.

Final Exam: Tuesday July 28, 2020   12:30 -2:30 p.m.

Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation.