FORMAN CHRISTIAN COLLEGE (A Chartered University)
Spring 2023
COMP303 – Design & Analysis of Algorithms (3 Credit Hours)
Section – A,B,C
Course Outline and Lesson Plan

Instructor Information:

Name: Rabranea Bqa
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Office: S426 (I)
Office Hours: TBD
Pre-requisites: Data Structures and Algorithms

Introduction: This course introduces basic methods for the design and analysis of efficient algorithms emphasizing methods useful in practice. Different algorithms for a given computational task are presented and their relative merits evaluated based on performance measures.

Aims and Objectives:

The goal of this course is to provide a solid background in the design and analysis of the major classes of algorithms. Upon successful completion of this course, students will be able to develop their own versions for a given computational task and to compare and contrast their performance.

Course Group:

Moodle is the platform that will be used for all material uploads from instructor and for submissions of assignments from students.

Text Book and Reference Reads:

- Introduction to Algorithms by Cormen, Leiserson, Rivest, and Stein, 3rd Ed., MIT Press, 2009.
- Analysis and Design of Algorithms 3rd ed. Edition by Amrinder Arora, 2017.
- Computer Algorithms: Introduction to Design and Analysis by Sara Baase, and Allen Van Gelder, 3rd Ed., Addison-Wesley, 2000.
- Data Structures and Algorithms by Aho, Hopcroft, and Ullman.
- Algorithms in C++ by Robert Sedgewick, Addison-Wesley.

Important to Know:

- Due Dates: All assignments are to be submitted on time. Late submissions will not be graded, unless previous accommodations have been made with the course instructor.
- Missed Quizzes: There will be no retake for the quiz, unless previous accommodations have been made with the course instructor. All quizzes except one will be announced quizzes.
- Attendance: Students are expected to attend all lectures. It is entirely the students' responsibility to recover any information or announcements presented in the classes they have missed.
- Academic Honesty: All work that you submit in this course must be your own. University policy will be applied in case of cheating or violation of academic integrity in any assessment.

Assessment Criteria: (Tentative*)

Quizzes	**15%**
Assignments	**15%**
Mid	**30%**
Final	**40%**

Few Optional* bonus activities will be given.

Tentative Lesson Plan:

Week 01	Lec 01: Introduction, Implementation Issues, Importance of Analyzing Algorithms. Brute Force Approach 2-D Maxima Problem. Lec02: Geometric Approach - 2D Maxima Problem.	
Week 02	Lec 03: Activity Based Class: Brute Force Approach Lec04: Introduction to Divide & Conquer Approach: Merge Sort	
Week 03	Lec 05: Merge Sort: Finding Recurrence Equation Lec06: Solving Recurrence Relations	Assignment 01
Week 04	Lec 07: Growth Rate of Functions Lec 08: Time Complexity of iterative Scripts: Independent Loop Counters	Quiz 01
Week 05	Lec 09: Time Complexity of iterative Scripts: Dependent Loop Counters Lec 10: Heap Structure for Heap Sort.	
Week 06	Lec 11: Heap Sort Continued, Time Complexity Analysis Lec 12: Quick Sort.	
Week 07	Lec 13: Activity based class. Practice Problems. Lec 14: Linear Time Sorting: Radix Sort, Counting Sort.	Quiz 02
	Revision and Mid-term Exam	
Week 09	Lec 17: Introduction of Dynamic Programming. Lec 18: Basic Problem solving with Dynamic Programming.	
Week 10	Lec 19: DP Approach: Edit Distance Algorithm Lec 20: DP Approach: Edit Distance Algorithm continued with time analysis.	Assignment 02

Week 11	Lec 21: DP Approach: 0/1 Knapsack Problem. Lec 22: DP Approach: 0/1 Knapsack Problem continued with time analysis.	Quiz 03
Week 12	Lec 23: DP Approach: DP - Chain Matrix Multiplication Lec 24: DP Approach: DP - Chain Matrix Multiplication continued with time analysis.	
Week 13	Lec 25: Activity Based Class: Identifying algorithmic approaches for various problems. Lec 26: Simple Recursive Functions vs DP: Problem Solving.	Assignment 03
Week 14	Lec 27: Introduction to Greedy Approach. Lec 28: Greedy Approach: Fractional Knapsack, Coin Change Problem.	Quiz 04
Week 15	Lec 29: Greedy Approach: Dijkstra Algorithm and application. Lec 30: Greedy Approach: Bellman ford Algorithm. Revision.	

Disclaimer: Course plan can be changed over the course of the semester. Students will be informed of the change as far in advance as possible.