Lahore University of Management Sciences

CS 310 – Algorithms

Fall 2023

Instructor	Naveed Anwar Bhatti
Room No.	9-G23A
Office Hours	Thursday: 3:00 – 4:00pm
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Secretary/TA	See the CS310 LMS site
TA Office Hours	See the CS310 LMS site
Course URL (if any)	
Class Hours	Monday and Wednesday: 9:30 am – 10:45 am

Course Teaching Methodology (Please mention following details in plain text)
• Teaching Methodology: We will have synchronous lectures.

Course Distribution	
Core	Computer Science
Elective	
Open for Student Category	All
Close for Student Category	

COURSE DESCRIPTION
In this course, we will study the design and analysis of efficient algorithms. The focus will be on fundamental techniques for designing and analyzing algorithms, including asymptotic analysis; divide-and-conquer algorithms, greedy algorithms, dynamic programming, graph algorithms, and NP-completeness

COURSE PREREQUISITE(S)	
•	CS 210 Discrete Math

COURSE OFFERING DETAILS				
Credit Hours	3			
Lecture(s)	Nbr of Lec(s) Per Week	2	Duration	75m
Recitation/Lab (per week)	Nbr of Lec(s) Per Week		Duration	
Tutorial (per week)	Nbr of Lec(s) Per Week		Duration	

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	
PEO-01	Demonstrate excellence in profession through in-depth knowledge and skills in the field of Computing.
PEO-02	Engage in continuous professional development and exhibit quest for learning.
PEO-03	Show professional integrity and commitment to societal responsibilities.

COURSE LEARNING OUTCOMES (CLOs)			
CLO	CLO Statement Students who complete the course will have demonstrated the ability to do the following:	Bloom's Cognitive Level	PLOs/Graduate Attributes (Seoul Accord)
CLO1	Analyze worst-case running times of algorithms using asymptotic analysis.	C4	PLO3
CLO2	Describe the various algorithm design paradigms including divide-and-conquer, dynamic programming, greedy algorithms, graphs, network flow and explain their suitability to various problems.	C2	PLO2
CLO3	Formulate solution to different problems using appropriate algorithms and evaluate the correctness and performance of such algorithms.	C5	PLO4
CLO4	Understand P, NP, polynomial reduction, and NP-Completeness. Develop basic understanding of some standard NP-Complete problems	C2	PLO3

GRADING BREAKUP AND POLICY			
Assessment	**Weight (%)**	**Related CLOs**	
Assignments	20%	CLO1- CLO4	
Quizzes	15-20% (We will have N - 3 policy for quizzes. 3 quizzes will be dropped. No petition for makeup quizzes will be accepted if you have missed up to 3 quizzes. If you have missed more than 3 quizzes for genuine reasons, you may file a petition for the 4th and subsequent missed quizzes. However, the petition may not be accepted if there is no substantial reason.)	CLO1 - CLO3	
Mid-term	25-30%	CLO1 - CLO3	
Final	35%	CLO1 - CLO4	

EXAMINATION DETAIL	
Midterm Exam	Yes/No: Yes Duration: 75 minutes Exam Specifications: The syllabus includes all the topic covered before the exam.
Final Exam	Yes/No: Yes Duration: 2 – 3 hours Exam Specifications: The syllabus includes all the topic covered before the exam.

COURSE OVERVIEW				
Week	**Topics**	**Book Chapters/ Recommended Reading from Text Book**	**Related CLOs**	
1/2	Introduction Asymptotic growth	Chapters 1 and 2	CLO1	
3	Graphs	Chapter 3	CLO1 - CLO3	
4/5	Greedy Algorithms	Chapter 4	CLO1 - CLO3	
6/7	Divide and Conquer	Chapter 5	CLO1 - CLO3	
8/9/10	Dynamic Programming	Chapter 6	CLO1 - CLO3	
11/12	Network Flow	Chapter 7	CLO1 - CLO3	
13/14	NP Completeness	Chapter 8	CLO4	

Textbook(s)/Supplementary Readings

Text Book

- Algorithm Design by Jon Kleinberg and Eva Tardos. Pearson 2006.

Reference Books

- Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein. Third Edition, July 2009. MIT Press.
- The Algorithm Design Manual by Steven S. Springer International Publishing. 2020.
- Algorithms by Robert Sedgewick R and Kevin Wayne. Addison-wesley Professional. 2011.

Academic Honesty

The principles of truth and honesty are recognized as fundamental to a community of teachers and students. This means that all academic work will be done by the student to whom it is assigned without unauthorized aid of any kind. Plagiarism, cheating and other forms of academic dishonesty are prohibited. Any instances of academic dishonesty in this course will be forwarded to the SBASSE Disciplinary Committee. For further information, students should make themselves familiar with the relevant section of the LUMS student handbook.

Harassment Policy

SSE, LUMS and particularly this class, is a harassment free zone. There is absolutely zero tolerance for any behavior that is intended, or has the expected result of making anyone uncomfortable and negatively impacts the class environment, or any individual's ability to work to the best of their potential.

In case a differently-abled student requires accommodations for fully participating in the course, students are advised to contact the instructor so that they can be facilitated accordingly.

If you think that you may be a victim of harassment, or if you have observed any harassment occurring in the purview of this class, please reach out and speak to me. If you are a victim, I strongly encourage you to reach out to the Office of Accessibility and Inclusion at oai@lums.edu.pk or the sexual harassment inquiry committee at harassment@lums.edu.pk for any queries, clarifications, or advice. You may choose to file an informal or a formal complaint to put an end of offending behavior. You can find more details regarding the LUMS sexual harassment policy here.

To file a complaint, please write to harassment@lums.edu.pk.

SSE Council on Equity and Belonging

In addition to LUMS resources, SSE's **Council on Belonging and Equity** is committed to devising ways to provide a safe, inclusive and respectful learning environment for students, faculty and staff. To seek counsel related to any issues, please feel free to approach either a member of the council or email at cbe.sse@lums.edu.pk

Rights and Code of Conduct for Online Teaching

A misuse of online modes of communication is unacceptable. Live online lectures and tutorials will be recorded. However, the interaction with the students during office hours will not be recorded. If there is a need to record such interaction, faculty or TA will seek consent from the student first. Please ensure if you do not wish to be recorded during a session to inform the faculty member. Please also ensure that you prioritize formal means of communication (email, lms) over informal means to communicate with course staff.