



Ahsanullah University of Science and Technology Bangladesh

COURSE OUTLINE

Part A

1. Course No./Course Code: **CSE2208(BNQF 061)**
2. Course Title: **Algorithms Lab**
3. Course Type (GE/Core Course/Elective): **Core Course**
4. Year/Level/Semester/Term: **Year 2 Semester 2**
5. Academic Session: **Fall 2021**
6. Course Teacher/ Instructor: **Md. Khairul Hasan, H M Zabir Haque, Md. Tanvir Rouf Shawon and Muhammed Yaseen Morshed Adib**
7. Pre-requisite(s): **CSE2103: Data Structures and CSE2103: Data Structures Lab**
8. Credit Value: **1.5**
9. Credit Hours: **3**
10. Total Marks: **100**
11. Rationale of the Course: **SDG4 (Ensure Technical Level Education) and SDG 8 (Reduce Unemployment Rate).**
12. Faculty: **Engineering**
13. Department: **Computer Science and Engineering (CSE)**
14. Programme: **Bachelor of Science in Computer Science and Engineering (B.Sc. in CSE)**
15. Course Objectives:
Laboratory works based on CSE2207 that includes: Algorithmic Complexity Analysis; Methods for the design of efficient algorithms: Divide and Conquer, Greedy method,

Dynamic programming, Backtracking, Branch and Bound, Polynomial evaluation, Lower bound theory, Intractable problems.

16. Mapping of Course Outcomes with Bloom's Taxonomy and Programme Outcomes

Sl. No.	COs	POs	Bloom's Taxonomy		
			C	A	P
1	Execute different algorithms design starting from scratch.	2			2
2	Apply appropriate algorithm concept to solve some well-known problems.	3			3
3	Adapt various algorithm designs for prospective solution.	5			4

17. Mapping of COs with Knowledge Profiles, Complex Engineering Problem Solving and Complex Engineering Activities

Course Outcome	Knowledge Profile	Complex Problem Solving	Complex Engineering Activities
CO1	K4		
CO2	K5		
CO3	K6		

Part B

18. Week-wise Course Plan

Week	Topics	Teaching-Learning Strategy	Assessment Strategy	Corresponding COs
1	Review of Sorting Algorithms (Bubble, Insertion and Selection) with complexity analysis. Discussion on Divide and Conquer Approach (Quick sort, Merge sort) with complexity analysis.	- Lecture - Think – Pair - Share (TPS)	-Class Performance	1
2	Discussion on Radix, Bucket Sort and Counting sort.	- Lecture - Think – Pair - Share (TPS)	- Class Performance - Home Assignment Viva	2

3	Discussion on Depth First Search and Breadth First Search.	- Lecture - Brain Storming Session - Think – Pair -Share (TPS)	- Class Performance - Class Assignment with Viva	1, 2
4	Topological Sort, Single Source Shortest Paths on Directed Acyclic Graph.	- Lecture - Brain Storming Session - Think – Pair -Share (TPS)	- Class Performance - Class Assignment with Viva	1, 2, 3
5	Discussion on Single Source Shortest Paths (Dijkstra Algorithm, Bellman-Ford Algorithm).	- Lecture - Think – Pair -Share (TPS)	- Class Performance - Home Assignment Viva	2, 3
6	Discussion on Minimum spanning tree (Prim and Kruskal Algorithms).	- Lecture - Brain Storming Session - Think – Pair -Share (TPS)	- Class Performance - Class Assignment with Viva	1, 2, 3
7	Discussion on Greedy Algorithms (Fractional Knapsack, Activity Selection).	- Lecture - Brain Storming Session - Think – Pair -Share (TPS)	- Class Performance - Class Assignment with Viva - Mid Term Examination	1, 2, 3
	Mid Break			
8	All Pair Shortest Path Algorithm (Floyd-Warshall algorithm).	- Lecture - Brain Storming Session - Think – Pair -Share (TPS)	- Class Performance - Class Assignment with Viva	1, 2, 3
9	Backtracking (N-Queens, Sum of subsets).	- Lecture - Brain Storming Session - Think – Pair -Share (TPS)	- Class Performance - Class Assignment with Viva	1, 2, 3
10	Branch-and-bound (TSP).	- Lecture - Think – Pair -Share (TPS)	- Class Performance - Home Assignment Viva	2, 3

11	Dynamic Programming (Matrix Chain Multiplication, Longest Common Subsequence).	- Lecture - Brain Storming Session - Think – Pair - Share (TPS)	- Class Performance - Class Assignment with Viva	1, 2, 3
12	Dynamic Programming (0-1 Knapsack, Travelling Salesman Problem).	- Lecture - Brain Storming Session - Think – Pair - Share (TPS)	- Class Performance - Class Assignment with Viva	1, 2, 3
13	Similarity testing by various algorithms.	- Lecture - Brain Storming Session - Think – Pair - Share (TPS)	- Class Performance - Lab Final Examination	1, 2, 3
14	String Matching The Knuth-Morris-Pratt Algorithm.	- Lecture - Think – Pair - Share (TPS)	- Class Performance - Home Assignment Viva	2, 3

Part C

19. Assessment and Evaluation

- 1) Assessment Strategy: ***Class Performance, Home Assignments/Offline, Class Assessment/Online, Midterm Examination, and Final Examination***
- 2) Marks distribution:
 - a) Continuous Assessment: ***Class Performance (20), Home Assignments/Offline (08), Class Assessment/Online (32)***
 - b) Summative: ***Midterm Examination (20), Final Examination (20)***
- 3) Make-up Procedures: ***N/A***

Part D

20. Learning Materials**20.1. Required (if any)**

1. ***“Introduction to Algorithms” by Thomas H. Cormen, Charles E. Leiserson , Ronald L. Rivest , Clifford Stein.3rd Edition.***
2. ***“Fundamentals of Computer Algorithms” by - Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran. 2nd Edition***
3. ***“Classic Data Structures” byDebasisSamanta. 2nd Edition.***
4. ***Course Website – <https://classroom.google.com>
CSE 2208 - Algorithms Lab
Class Code: -----***

20.2. Recommended (if any)

5. ***<https://cp-algorithms.com/>***
6. ***<https://visualgo.net/en>***
7. ***<https://uva.onlinejudge.org/>***

20.3. Others (if any)

Prepared by:	Checked by:	Approved by:
Signature: _____	Signature: _____	Signature: _____
Name:H M Zabir Haque, Md. Tanvir Rouf Shawon and Md. Khairul Hasan Department: CSE Date: 23. 05. 2022	Name:H M Zabir Haque OBE Program Coordinator, CSE Date:	Name:Dr. Mohammad Shafiul Alam HOD, CSE Date:

Annex-1: PEO of CSE

PEO1 - Professionalism

Graduates will demonstrate sound professionalism in computer science and engineering or related fields.

PEO2 – Continuous Personal Development

Graduates will engage in life-long learning in multi-disciplinary fields for industrial and academic careers.

PEO3 – Sustainable Development

Graduates will promote sustainable development at local and international levels.

Annex-2: Mapping of PEO-PO

	PEO1	PEO2	PEO3
PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	√		
PO2 - Problem analysis: Identify, formulate, research and analyze complex engineering problems and reach substantiated conclusions using the principles of mathematics, the natural sciences and the engineering sciences.	√		
PO3 - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.	√		
PO4 – Investigation: Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.	√		
PO5 - Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	√		
PO6 - The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	√		√

PO7 - Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.	√		√
PO8 – Ethics: Apply ethical principles and commit to professional ethics, responsibilities and the norms of engineering practice.	√		
PO9 - Individual work and teamwork: Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.	√	√	
PO10 – Communication: Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.	√		
PO11 - Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.	√		
PO12 - Life-long learning: Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.		√	

Annex-3: Blooms Taxonomy *

Level	Cognitive Domain – Revised Version	Affective Domain	Psychomotor Domain
1	Remember (1)	Receiving Phenomena (1)	Perception (1)
2	Comprehend (2)	Responding to Phenomena (2)	Set (2)
3	Apply (3)	Valuing (3)	Guided Response (3)
4	Analyse (4)	Organizing Values (4)	Mechanism (4)
5	Evaluate (5)	Internalising Values (5)	Complex Overt Response (5)
6	Create (6)		Adaption (6)
			Origination (7)

* Based on “REVISED BLOOM’S TAXONOMY INDICATOR v3.31” , available at <http://adept.mmu.edu.my/wp-content/uploads/2018/09/Blooms-Taxonomy-Indicator-v3.31.xl>