Course Description and Outcome Form
Department of Computer Science and Engineering School of Engineering and Computer Science
Brac University

A. Course General Information:

Course Code:	CSE 220 CSE 220L
Course Title:	Data Structures Data Structures Laboratory
Credit Hours (Theory+Lab):	3 + 0
Contact Hours (Theory+Lab):	3 + 3
Category:	Program Core
Type:	Required, Engineering , Lecture + laboratory
Prerequisites:	CSE 111 Programming Language II
Co-requisites:	NO

B. Course Catalog Description (Content):

This course is an introduction to data structures, where the students will study the elementary data structures such as arrays, lists, stacks, queues, trees, etc. These data structures will be used to study and implement different algorithms such as sorting, searching, tree traversal, etc. The course includes a 3 hour mandatory laboratory per week as CSE220L. In the laboratory, the students will use a standard programming language, usually Java, to implement the various data structures and algorithms learned in the theory component of the course.

C. Course Objective:

a. Teach students the basics of circular array and advantage(s) of it over a linear array

b. Demonstrate the construction and manipulation of different types of linked lists

c. Introduce the students to stack and queue data structures and explain how they are implemented

d. Discuss the fundamental concept of recursion so that they can build recursive models for simple problems.

e. Discuss trees and explain related algorithms

D. Course Outcomes (COs):

Upon successful completion of this course, students will be able to

Sl.	CO Description	Weightage (%)
CO1	**Show** different operations such as insertion, removal, rotation, shifting, etc. on linear arrays, circular arrays, linked lists, Stack, Queue and Tree data structures.	25%
CO2	**Demonstrate** basic algorithms related to searching and tree traversal using various data structures.	25%
CO3	**Compare** the suitability and merits of various data structures and basic algorithms when given certain requirements or constraints.	10%
CO4	**Apply** concepts of recursion to solve programming problems.	15%
CO5	**Construct** general-purpose data structures and basic algorithms for solving programing problems.	25%

E. Mapping of CO-PO-Taxonomy Domain & Level- Delivery-Assessment Tool:

Sl.	CO Description	POs	Bloom's taxonomy domain/level	Delivery methods and activities	Assessment tools
CO1	**Show** different operations such as insertion, removal, rotation, shifting, etc. on linear arrays, circular arrays, linked lists, Stack, Queue and Tree data structures.	a	Cognitive/ Apply	Lecture + Lab	Assignment, Quiz, Exam, Lab Work
CO2	**Demonstrate** basic algorithms related to searching, tree traversal using various data structures.	a	Cognitive/ Apply	Lecture + Lab	Assignment, Quiz, Exam, Lab Work
CO3	**Compare** the suitability and merits of various data structures and basic algorithms when given certain requirements or constraints.	a	Cognitive/Evaluate	Lecture	Exam
CO4	**Apply** concepts of recursion to solve programming problems.	a	Cognitive/ Apply	Lecture + Lab	Assignment, Quiz, Exam, Lab Work
CO5	**Construct** general-purpose data structures and basic algorithms for solving programing problems.	c	Cognitive/ Create	Lab	Lab work

F. Course Materials:

i. Text and Reference Books:

Sl.	Title	Author(s)	Publication Year	Edition	Publisher	ISBN
1	Algorithms in Java	Robert Sedgewick and Kevin Wayne	2011	4th Edition	Addison-Wesley	ISBN-10: 032157351X ISBN-13: 9780321573513
2	Introduction to Algorithms	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein	2009	3rd Edition	MIT Press	ISBN-10: 0262033844 ISBN-13: 9780262033848

G. **Lesson Plan (Theory):**

No	Topic	Week/Lecture#	Related CO (if any)
1	Arrays and Multi-Dimensional Arrays	Lecture 1, 2, 3	CO1, CO3, CO5
2	Linked lists	Lecture 4, 5, 6, 7, 8	CO1 CO3, CO5
3	Stacks (using arrays and linked lists)	Lecture 9, 10	CO1 CO3, CO5
4	Queues (using arrays and linked lists)	Lecture 11, 12	CO1 CO3, CO5
Review and Midterm Exam			
5	Recursion	Lecture 13, 14	CO4, CO5
6	Hash table and Hashing	Lecture 15, 16	CO2 CO3, CO5
7	Introduction to Trees and BST	Lecture 17, 18	CO1, CO2, CO5
8	Introduction to Heap	Lecture 19, 20	CO1, CO2, CO5
9	Graph	Lecture 21, 22	CO3
Review and Final Exam			

Lesson Plan (Laboratory):

No	Topic	Week/Lecture#
1	Linear array, Multi-Dimensional Array	Week 1
2	Singly Linked List (basic)	Week 2
3	Singly Linked List (basic) Continuation	Week 3
4	Dummy headed circular doubly linked list	Week 4
5	Build a stack using List Use the stack for parentheses checking	Week 5

6	Build a queue using a circular array. Apply the queue in a problem	Week 6
7	Lab Midterm Assessment	Week 7
8	Recursion	Week 8
9	Searching, Sorting	Week 9
10	Key-indexing, Hashing	Week 10
11	Tree, graph	Week 11
12	Lab Final Assessment	Week 12

H. Assessment Tools:

Assessment Tools	**Weightage (%)**
Quizzes	15%
Midterm Exam	25%
Lab	25%
Final Exam	35%

I. CO Assessment Plan:

Assessment Tools	**Course Outcomes**				
	CO1	**CO2**	**CO3**	**CO4**	**CO5**
Quizzes					
Midterm Exam	✓		✓		✓
Lab	✓	✓	✓	✓	✓
Final Exam	✓	✓	✓	✓	

J. CO Attainment Policy:

As per BRAC University Policy.

K. Grading policy:

As per BRAC University Policy

L. Course Coordinator: Zaber Mohammad, Avijit Biswas