Department of Liberal Education
Era University, Lucknow
Course Outline
Effective From: 2023-24

Name of the Program	**B.A. / B.Sc. (LIBERAL EDUCATION)**			**Year/ Semester:**	**1st / 2nd**
Course Name	**Data Structure and Algorithm Using C**	**Course Code:**	**CS102**	**Type:**	**Theory**
Credits	**05**			**Total Sessions Hours:**	**75 Hours**
Evaluation Spread	**Internal Continuous Assessment:**	**50 Marks**		**End Term Exam:**	**50 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	1. Describe the usage of Data Structure and Algorithm and problem solving techniques with the help of the Algorithm. 2. To develop students' knowledge and understanding of the fundamental principles of data structures. 3. Develop students' skills in analyzing data structures. 4. Build up students' capacity to evaluate different algorithmic techniques.				
Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	**Attributes**				
CO1	Describe the basic operations on arrays, lists, stacks, and queue data structures.				
CO2	Explain the notions of hashing, trees, and binary search trees.				
CO3	Describe the efficiency of algorithms with respect to the choice of data structures.				
CO4	Implement the algorithm by an application-based program.				
Pedagogy	Interactive, discussion-bases, student-centered, presentation.				
Internal Evaluation Mode	Mid-term Examination: 20 Marks Activity: 10 Marks Class test: 05 Marks Online Test/Objective Test: 05 Marks Assignments/Presentation: 05 Marks Attendance: 05 Marks				
Session Details	**Topic**			**Hours**	**Mapped CO**
Unit 1	**Introduction and Overview:** Basic Terminology, Elementary Data Organization, and Data Structure Operations, Time, and space complexity of algorithms and asymptotic notations. **Arrays:** Array Definition, Representation and Analysis, Single and Multidimensional Arrays, Address Calculation, Application of Arrays. **Activity:** • Programs on array operations.			15	CO1
Unit 2	**Linked list:** Introduction, Representation, and Implementation of Linked Lists, Types of Linked List, Operations of Linked List, and			18	CO2

	application of Linked List, Garbage collection. **Activity:** • Programs on singly and doubly linked list operations.		
Unit 3	**Stacks:** Introduction to Stack, Array Representation and Implementation of the stack, **Operations on Stacks:** Push & Pop, Linked Representation of Stack, Postfix and Prefix conversions, Evaluation of expressions using stack, Applications of Stacks, Towers of Hanoi **Queues:** Definition, Array representation of queue, Linked list representation of queue Types of queues: Simple queue, Circular queue, Double-ended queue, Priority queue, Operations on Queues, Applications of queues. **Activity:** • Programs on stack and queue operations.	20	CO3
Unit 4	**Graphs:** Terminology and Representations, Graphs and Multi-Graphs, Directed Graphs, Traversal of Graphs: Breadth-First Search, Depth First Search. **Tree:** Basic terminology, Binary Trees, Binary tree representation and Traversal, Binary Search Trees. **Sorting:** Bubble sort, Insertion sort, Selection Sort **Searching:** Linear Search, Binary Search. **Activity:** • Programs on Binary Tree traversals. • Programs on searching and sorting.	22	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	1	1	1		2	3	2	3	1	1	3	1	1
CO2	2	3	2		1	2	2	2	1	2	1	2	2	2
CO3	2	2	1	1		2	1	1	2	1	2	2	2	3
CO4	3	1	2		1	1	1	1	2	1	1	1	1	3

Strong contribution-3, Average contribution-2 , Low contribution-1,

Suggested Readings:

Text- Books	1. Data Structure, Seymour Lipschutz, Tata-McGraw-Hill, 10th Edition, 2014. 2. Fundamentals of DS in C, Horowitz, Sahni & Anderson-Freed, University Press, 2nd Edition 2009.
Reference Books	1. An Introduction to Data Structures with Applications., Jean-Paul Tremblay & Paul G, McGraw Hill Publishing, 7th Edition, 2014. 2. Data Structures: A Pseudo-code approach with C, Gilberg & Frozen, Thomson Learning, 3rd Edition 2010. 3. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
Para Text	**Unit 1:** • https://archive.nptel.ac.in/courses/106/106/106106133/ **Unit 2:** • https://archive.nptel.ac.in/courses/106/106/106106127/ **Unit 3:** • https://archive.nptel.ac.in/courses/106/102/106102064/ **Unit4:** • https://archive.nptel.ac.in/courses/106/105/106105085/
Recapitulation & Examination Pattern	
Internal Continuous Assessment:	

Component	Marks	Pattern
Mid Semester	20	**Section A:** Contains **10** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **0.5 Marks.** **Section B:** Contains **07** descriptive questions out of which **05** questions are to be attempted. Each question carries **03 Marks**.
Activity	10	Will be decided by subject teacher
Class Test	05	Contains **05 descriptive questions.** Each question carries **01** Mark.
Online Test/ Objective Test	05	Contains **10 multiple choice questions.** Each question carries **0.5** Marks.
Assignment/ Presentation	05	Assignment to be made on topics and instruction given by subject teacher
Attendance	05	As per policy
Total Marks	**50**	

Course created by: Dr. Mohd Haleem

Signature:

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Signature: