# FACULTY OF COMPUTER SCIENCE

## Master of Computer Application (Integrated) (Sem-III)

In Effect from Academic Year 2023-24

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|---|---|
| **Branch Name:** | **IMCA** |
| **Program Code:** | **CS301** |
| **Course Name:** | **DATA STRUCTURES-I** |
| **Course Code:** | **1CS3010303T** |
| **Pre-requisite Course:** | **Basic knowledge of programming language like C** |

### Course Objectives:

1. To extend proficiency in implementation of Data Types.
2. To be able to carry out the study of various Algorithms of Time and Space Complexity.
3. To get a good quality understanding of applications of Data Structures.

| Teaching Scheme (Hours per week) | | | | Evaluation Scheme (Marks) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | | Practical | | |
| Lecture | Tutorial | Practical | Credit | University Assessment | Continuous Assessment | University Assessment | Continuous Assessment | Total |
| 3 | - | - | 3 | 60 | 40 | - | - | 100 |

### Subject Contents:

| Sr. No | Topic | Total Hours | Weightage (%) |
|---|---|---|---|
| 1 | **Introduction to Data Structures :** Data, Information, Data Structures, Classification of Data Structures, Operations of Data Structures, Primitive Data Structures, Non Primitive Data Structures, String Manipulation, String Function ,Pattern Matching, Storage Representation of Strings , KWIC Indexing, Text Handling | 8 | 25 |
| 2 | **Linear Data Structures:** **Array:** Arrays, Storage Structure for Arrays, Arrays with structure. **Stack:** Stack, Stack representation, stack operation and Application of Stack, Infix notation, prefix notation, postfix notation. | 10 | 25 |
| 3 | **Linear Data Structures:** **Queue:** Queue Data Structure, Representation and Implementation of Queue, Basic operation Queue, Simple Queue, D-Queue, Circular Queue, Priority Queue, Application of Queue. | 15 | 25 |
| 4 | **Linear Data Structures:** **Link List:** Link List, Representation of Link List , Basic operation of Link List, Singly / Simple Link List ,Doubly Link List, Circular Link List , Pointers & Linked Lists, Applications of Linked Lists. | 15 | 25 |

### Text Books:


1. "An Introduction to Data Structures with Applications", Jean-Paul Tremblay, Paul G. Sorenson, Tata McGraw-Hill, 2nd Edition, (2007).
2. "Data Structures Via C++: Objects by Evolution", A. Michael Berman, , Oxford Univ. Press (2004)
3. "Sorting & Searching - The Art of Computer Programming" D E Knuth, Vol. 3, Pearson Education (1998).


### Reference Books:


1. “Fundamentals of Data Structures in C”, Horowitz, Sahni, Anderson-Freed, , University Press (2nd edition-2007)
2. "Data Structures Using C & C++", Tenenbaum, PHI.

**List of Open Source Software/learning website:**

1. https://www.w3schools.in/data-structures
2. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

**Course Learning Outcomes (CLO): On completion of this course, the students will be able to:**

| CLO | Description | Bloom'sTaxonomyLevel |
|---|---|---|
| CLO1 | To be able to describe and classify fundamental concepts of object-oriented programming, basic and advanced data structures. | 2 Understand |
| CLO2 | To choose the best algorithm to solve a problem by considering various problem characteristics, such as the data size, the type of operations, etc. | 1 Remember<br>3 Apply |
| CLO3 | To create the algorithms and program of various operations on Queues, Stacks, Linked Lists. | 2 Understand<br>3 Apply |
| CLO4 | To evaluate algorithms with respect to time and space complexity | 3 Apply<br>2 Understand |
| CLO5 | To be able to design, implement and debug small-to-moderate programs to manipulate and manage data elements while exhibiting the object-oriented programming skills. | 7 Create<br>6 Evaluate<br>5 Analyze |
| CLO6 | To be able to explain, understand, compare and apply algorithms and principles of object-oriented programming and advanced data structures to a specific situation. | 2 Understand<br>1 Remember |

**Mapping of CLOs with Pos & PSOs**

| Course Learning Outcomes | Program Outcomes(POs) | | | | | | | | | | | | Program Specific Outcomes(PSOs) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CLO1 | **M** | **M** | **L** | | M | | **L** | M | L | M | | **M** | **H** | **M** |
| CLO2 | M | M | H | | | **M** | M | | | **H** | L | L | **H** | **M** |
| CLO3 | H | M | H | | **M** | **M** | | **M** | L | M | | H | **L** | **M** |
| CLO4 | M | | **H** | **M** | M | **L** | M | **L** | **M** | | H | H | H | **M** |
| CLO5 | H | M | H | | **M** | **M** | | **M** | L | M | | H | **L** | **M** |
| CLO6 | M | | **H** | **M** | M | **L** | M | **L** | **M** | | H | H | H | **M** |

**H: High, M: Medium, L: Low**