

Course Learning Objectives (CLOs): This course focuses on the following learning perspectives:

- Explore user-defined data structures like structures and pointers in implementing solutions to problems.
- Selection of appropriate data structures for solving a given problem.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs (13-16)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the usage and the need for writing programs using structures, unions and pointers.	-	1,2,3	-
CO-2	Solve real time problems using concepts of dynamic memory allocation and storage classes.	-	1,2,3	-
CO-3	Construct Programming solutions using user defined functions and files for storage.	-	1,2,3	-
CO-4	Demonstrate sorting and searching algorithms.	-	1,2,3	-
CO-5	Select appropriate programming constructs and data structures to build solutions to variety of problems.	-	1,2,3	12,14

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mapping Level	2.0	2.0	2.0	-	-	-	-	-	-	-	-	1.0	-	1.0	-	-

Pre-requisites: Knowledge of fundamental Principles of Programming.

Contents:

Unit-I

Pointers: Introduction, Understanding Pointers, Accessing the address of a variable, Declaration and Initialization of Pointers, Accessing a variable through its pointer, Chain of pointers, Pointer expressions, Pointer Increments and scale factor, Pointers and arrays, Pointers and character strings, Pointers as Function arguments, Functions returning pointers. **8 Hrs**

Unit-II

Structures and Unions: Introduction, Defining a Structure, Declaring structure variables, Accessing structure members, structure initialization, copying and comparing structure variables, Operations on Individual Members, Arrays of structures, Arrays within structures, Structures within structures, Structures and Functions, Self-referential structures, Unions. **8 Hrs**

Unit-III

Storage Classes: Storage class specifiers, Local variable storage class: auto, register, and static. Global variable storage class: default global variable, extern, and static.

Dynamic Memory allocation: Motivation for dynamic memory requirement, Allocating a block of memory – malloc, allocating multiple blocks of memory – calloc, Releasing the used memory – free, Altering the size of a block – realloc. **8 Hrs**

Unit-IV

File Handling: Introduction, Defining an opening a file, Closing a file, Input and Output Operations on Files, Error Handling during IO operations, Random Access to Files, Command line arguments. **8 Hrs**

Unit-V

Sorting: Introduction, Bubble Sort, Selection Sort, Insertion Sort.

Searching: Introduction, Linear Search, Binary Search. **8 Hrs**

Laboratory Component:

Working Platform: Linux Operating System

Expected Coding Practices:

1. Use of Good Programming practices: Declaration of variables, Indentation, Documentation, Simplicity of logic, Efficiency of logic, uniformity etc.
2. Generic and Reusable code.
3. Inclusions of exceptional cases.
4. Better usability

Course Contents:

Programming exercises of varying complexity, to meet the learning results stated in course outcomes for this course.

Reference Books:

- 1 E Balagurusamy, "Programming in ANSI C", 6th Edition, Tata McGraw Hill, 2012.
- 2 Yashavant Kanetkar, "Understanding Pointers in C and C++", 5th Edition, BPB Publications, 2019.
- 3 Reema Thareja, "Computer fundamentals and Programming in C", Oxford University, Second Edition, 2017.
- 4 B A Forouzan and R F Gilberg, "Computer Program: A structured programming approach using C", 3rd Edition, Thomson Learning, 2005
- 5 Brain W. Kernighan and Rob Pike, "The Practice of Programming", Pearson Education Inc. 2008.