

# C Basics

- History of C
- Characteristics of C
- C Program Structure
- Variables
  - Defining Global Variables
  - Printing Out and Inputting Variables
- Constants
- Arithmetic Operations
- Comparison Operations
- Logical Operators
- Order of Precedence

## Conditionals

- Conditionals
- The if statement
- The? Operator
- The switch Statement

## Looping and Iteration

- The for statement
- The while statement
- The do-while statement
- Break and continue

## Arrays and Strings

- Defining, initializing and using arrays
- Single and Multi-dimensional Arrays
- Arrays of Characters and Strings
- Arrays and pointers
- Strings

## Functions

- Role of Functions
- Passing arguments to functions
- Returning values from functions
- Recursive functions
- Call back functions
- Implications on Stack
- Pass by value / reference
- Passing Arrays to functions

## String Handling : <string.h>

- Basic String handling functions
- String Searching
- Character Conversions and testing : <ctype.h>
- Memory Operations: <memory.h>

## Structures and Unions

- Structures
- Nested Structures
- Array of Structures
- Allocation of memory and holes
- Unions

## Further Data Types

- Coercion or Type-Casting
- Enumerated Types
- Static Variables

## Dynamic Memory Allocation & Dynamic Structures

- Malloc, Sized, and Free
- Calloc and Realloc

## Advanced Pointer Topics

- The purpose of pointers
- Defining pointers
- The & and \* Operators
- Pointer Assignment
- Pointers with functions
- Pointer Arithmetic
- Advanced pointer types
- Pointers to functions
- Pointers to String
- Pointers and Dynamic memory
- Pointers and Structures
- Common Pointer Pitfalls
  - Dangling Pointers &. Memory Leak

## Storage Classes

- Scope
- Internal
- External
- Automatic
- Static
- Scope and extent of parameters

## Low Level Operators and Bit Fields

- Bitwise Operators
- Bit Fields
  - Bit Fields: Practical Example
  - A note of Caution: Portability

## The C Processor

- #define
- #undef
- #include
- #if – conditional inclusion
- Preprocessor Compiler Control
- Other Preprocessor Commands

## Integer Functions, Random Number

- String Conversion : <stdlib.h>
- Arithmetic Functions
- Random Numbers
- String Conversion

## Mathematics: <math.h>

- Math Functions
- Math Constants

## Input and Output (I/O) : <stdio.h>

- Reporting Errors
  - perror()
  - errno
  - exit()
- Streams
  - Predefined Streams
  - Redirection
- Basic I/O
  - Formatted I/O
  - Printf
- Scanf
- Files
  - Reading and writing files

- Sprintf and sscanf  
Stream Status Enquiries

## Data Structures

- Linked Lists
- Stacks & Queues
- Binary Tree

## Sorting & Searching Techniques

- Insertion Sort
- Merge Sort
- Quick Sort