

Course Name	: Computer Programming
Course Number	: MA-514
Credit	: 3-0-0-3
Prerequisites	: None
Students intended for	: M.Sc./M.S./Ph.D.
Elective or core	: Core for M.Sc. in Applied Mathematics and Elective for other discipline
Semester	: Odd/Even

### **Course Objective:**

This course is written with the primary objective to introduce the C and C++ programming languages. C is a practical and still-current software tool; it remains one of the most popular programming languages in existence, particularly in areas such as embedded systems. C facilitates writing code that is very efficient and powerful and, given the ubiquity of C compilers, can be easily ported to many different platforms. Also, there is an enormous code-base of C programs developed over the last 30 years, and many systems that will need to be maintained and extended for many years to come.

### **Course Outline:**

**Unit 1: Introduction to Computer Programming** -- Programming and Programming Languages, Flowchart, The C Programming Language, Identifiers, Symbolic Constants, Declarations, Arithmetic Operations, Relational and Logical Operations. [4]

**Unit 2: Branching and Iteration** – If-Else, ?: Conditional Expression, Switch, While Loops, Do-While Loops, For Loops, Break and Continue, Goto. [6]

**Unit 3: Functions** - Function Prototypes, Call by reference, Call by arguments, recursive function, inline function. [4]

**Unit 4: Pointers** - What is a Pointer? Pointer Syntax, Pointers and Arrays, Pointer Arithmetic, Return Values and Pointer, Pointers to Pointers, Function Pointers, Dynamic Memory allocation. [6]

**Unit 5: Arrays and Strings** - Array Initialization, Character Arrays and Strings, Strings and the Standard Library, Arrays of Pointers, Multi-dimensional Arrays. [5]

**Unit 7: Input and Output** - Formatted IO: printf, scanf, string formatting; File IO: Opening and Closing Files, Standard IO, Sequential File Operations. [5]

**Unit 8: Object-oriented programming** – Introduction to User define datatype, Fundamentals of the object-oriented approach, introduction to class and its components, constructors, referring to

objects of a class, static members, classes and their friends, Introduction to STL and application.  
[12]

**Text Books:**

1. V. Rajaraman, COMPUTER PROGRAMMING IN C, PHI Learning (2004).
2. E. Balagurusamy, Programming In Ansi C, 3<sup>rd</sup> edition, Tata McGraw-Hill Publication, New Delhi, 2004.
3. Walter Savitch, Problem Solving with C++: Global Edition, 9th edition, Pearson Education, November 2014.
4. Robert Lafore, Object Oriented Programming In C++, 4<sup>th</sup> edition, Pearson Education India (2004).

**Reference Book:**

1. Bjarne Stroustrup, The C++ Programming Language, Pearson Education, 4th Edition, 2013.
2. Brian W. Kernighan, *The C Programming Language (Ansi C Version)*, PHI; 2 edition (1990).
3. Brian W. Kernighan, Dennis M. Ritchie, *Programming Languages C with Practicals*, Margham Publications; 1 edition (2012).