CS 101 Programming and Problem Solving

Prerequisites: None

Course Contents:

Introduction to Computer Problem Solving (15%)

Problem Solving Process - Hierarchy charts to plan the program design - Algorithms - Iterative versus recursive style - Modular Programming - Structured Programming - Algorithm representation using Psuedocode, Algorithm Testing, brief introduction to Efficiency of Algorithms - Data Verification v/s Validation – Module design – Cohesion – Coupling – Fan-in – Fan-out concepts

Fundamental Algorithms for Problem Solving (30%)

Algorithms for Exchanging the values – Counting – Factorial Computation – some trigonometric functions computation as a sum of series – Base Conversion of numbers – Factoring Methods – Array Techniques – Sorting Algorithms - Bubble, Selection, Insertion, Merge Sort, Quick Sort–Sequential and Binary Search Algorithms. Algorithms for implementing numerical methods such as Newton Raphson and Runga Kutta Methods.

Introduction to 'C' / any Programming Language (15%)

Overview of C – Constants, Variables and Data Types; Operators and Expressions; Managing Input/Output Operations – Formatted I/O; Decision Making – Branching - IF, Nested IF – Switch – goto; Looping- While, do, for statements.

Arrays, Functions, Structures and Unions (20%)

Arrays – static, dynamic and multi-dimensional arrays - Character arrays and Strings – String handling Functions - User defined Functions – Recursion; Structures and Unions – Array of Structures – Structures and Functions

Pointers and File Management (20%)

Pointers– Declaration, Accessing a variable, character strings, pointers to functions and structures; File Management in 'C'/ any programming language; Dynamic Memory allocation– Linked Lists; Preprocessor Directives; Storage Classes, Command-line Arguments, multi-file programs and use of make utility.

Main Reading

1. Jeri R. Hanly and Eliot B. Koffman "Problem Solving and Program Design in C" Pearson Education, VII Edition, 2012
2. R.G.Dromey "How to Solve it by Computer ", PHI , 1998

Supplementary Reading

1. S.K. Srivastava "C in Depth", BPB, 2004
2. Deitel and Deitel "C How to Program ", Addisson Wesley , 2001
3. E.Balagurusamy " Programming in ANSI C " , Tata McGraw Hill, 2004
4. Brian W.Kernighan & Dennis Ritchie "C Programming Language", PHI, 1990
5. Byron.S.Gottfried "Schaum's Outline of Programming with C", 2nd Edition, 1996