

Computer Programming

1.1 Course Number: CS101

1.2 Contact Hours 3-1-2 Credits: 13

1.3 Semester-offered: 1st Year-Odd

1.4 Prerequisite: NA

1.5 Syllabus Committee Member: Dr. Sushum Biswas, Dr. Daya Sagar Gupta & Dr. Gargi Srivastava

2. **Objective:** The objective of the course is to

- i. To introduce problem solving methods and algorithm development.
- ii. To teach programming language C.
- iii. To teach how to design, code, debug and document programs using techniques of good programming style.

3. **Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Introduction to programming	Introduction to programming, Programming paradigms, Linux and Integrated Development Environment (IDE).	2
2	Introduction to Programming language C	Basic syntax and semantics, Variables, Types, Expressions, Assignment statements, Conditional and iterative control structures.	8
3	Program design	Simple I/O and file handling, Functions and parameter passing, Strings and string processing, Arrays and recursion, Pointers and references (introduction only), Structures and Classes, Standard library	8
4	Basics of data structures and algorithm development	Techniques of problem solving, Stepwise refinement, Simple numerical examples, algorithms for searching and sorting, merging order lists.	6
5	Case Studies	Case studies taken from such areas as business applications involving data manipulation	2
6	Python	Introduction to Python;	7

		Data types, variables, basic input-output operations; basic operators; Boolean values, conditional execution, loops, lists and list processing, logical and bitwise operations; Functions, tuples, dictionaries, and data processing; Modules, packages, string and list methods, and exceptions; The object-oriented approach, classes, methods, objects and the standard objective features, exception handling. and working with files	
7	MATLAB	The basics; Root-finding; Basic plotting; Vectorization; Fractals and chaos; Debugging with MATLAB; Conway game of life; Library	7
		Total	40

4. Readings

4.1 Textbook:

- i. *C Programming 2e* by K N King, W. W. Norton and Company, 2008
- ii. *Let Us C* by Yashavant Kanetkar, BPB Publications, 2017.
- iii. Python and matlab: no specific book, online course materials

4.2 Reference books:

- i. *Programming in ANSI C* by Balaguruswami
- ii. *The C Programming Language* by Kernighan and Ritchie
- iii. *The Art of Computer Programming* by Donald Knuth

5 Outcome of the Course:

- i. Analyze and explain the behavior of simple programs involving the fundamental programming constructs.
- ii. Modify and expand short programs that use standard conditional and iterative controls structures and functions.
- iii. Design, implement, test and debug a program that uses each of fundamental programming constructs.
- iv. Apply the technique of structured decomposition to break a program into smaller pieces.