

Principles of Programming Languages

- 1.1 Course Number: CS223
- 1.2 Contact Hours: 3-0-0 Credits: 09
- 1.3 Semester-offered: 2nd Year- Odd
- 1.4 Prerequisite: Programming
- 1.5 Syllabus Committee Member: Dr. Sushum Biswas, Dr. Daya Sagar Gupta & Dr. Gargi Srivastava

2. **Objective:** To introduce the major programming paradigms, and the principles and techniques involved in design and implementation of modern programming languages.

3. **Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Introduction & Procedure based languages	History and Need of Various types of Programming Languages(PL), Types of PL, Characteristics of PL, Syntax, Semantics, Pragmatics Analysis, Procedure based languages: General features, Data types, Abstract Data Types (ADT), Structuring, Syntax, Semantics, RAM model of computation, Example: C language	8
2	Object based languages	Concepts of objects, Class vs ADT, control structures, methods, General features-inheritance, polymorphism, derived classes & information hiding, Example: C++ and Java, Difference with C.	6
3	Concurrent programming languages	Concurrency structure for message passing, loosely coupled system, shared memory, PRAM, monitor, semaphore, Example: Java RMI, Parallel Java, Parallel C.	8
4	Logic programming	Predicate calculus- Logical operators, Propositional forms, Rules of inference, Logical equivalence, Quantification, Well formed formula, Disproofs; Prolog- Syntax, Lists, Operators and arithmetic, Control, i/o, data structures.	9

5	Functional programming	Lambda calculus- Lambda expressions, Variables, Substitutions, Arithmetic, Conditionals, Recursion, Lambda reduction, Type assignment, Polymorphism, Lambda calculus and computability; Lisp- Control constructs, List processing, Files and i/o, Generic functions, Objects, Exceptions.	9
Total			40

4. **Readings**

4.1 Textbook:

1. *Programming Languages: Concepts and Constructs* by Ravi Sethi, Pearson Education.
2. *Programming Language Concepts* by Carlo Ghezzi and Mehdi Jazayeri, John Wiley & Sons.
3. *Suggested by the Instructor*

4.2 Reference books:

1. *Programming Languages: Paradigm and Practices* by Doris Appleby and J. J. Vandekopple, McGraw Hill.
2. *Concepts of Programming Languages* by Robert W. Sebesta, Pearson Education.

5 **Outcome of the Course:** The following are the official course goals agreed upon by the faculty for this course:

- Knowledge of, and ability to use, language features used in current programming languages.
- An ability to program in different language paradigms and evaluate their relative benefits.
- An understanding of the key concepts in the implementation of common features of programming languages.