Course code	Course Name	L-T-P Credits	Year of Introduction
CS403	PROGRAMMING PARADIGMS	3-0-0-3	2016

Course Objectives:

- To introduce the basic constructs that underlie all programming languages
- To introduce the basics of programming language design and implementation
- To introduce the organizational framework for learning new programming languages.

Syllabus:

Names, Scopes, and Bindings - Binding Time, Scope Rules, Storage Management, Overloading, Polymorphism; Control Flow - Expression Evaluation, Structured and Unstructured Flow, Non-determinacy; Data Types - Type Systems, Type Checking, Equality Testing and Assignment; Subroutines and Control Abstraction - Static and Dynamic Links, Calling Sequences, Parameter Passing, Exception Handling, Co-routines; Functional and Logic Languages; Data Abstraction and Object Orientation -Encapsulation, Inheritance, Dynamic Method Binding; Innovative features of Scripting Languages; Concurrency - Threads, Synchronization, Language-Level Mechanisms; Run-time program Management.

Expected Outcome:

The Students will be able to :

i. compare scope and binding of names in different programming languages
ii. analyze control flow structures in different programming languages
iii. appraise data types in different programming languages
iv. analyze different control abstraction mechanisms
v. appraise constructs in functional, logic and scripting languages
vi. analyze object oriented constructs in different programming languages
vii. compare different concurrency constructs
viii. interpret the concepts of run- time program management

Text book:

1. Scott M L, Programming Language Pragmatics, 3rd Edn., Morgan Kaufmann Publishers, 2009.

References:

1. David A Watt, Programming Language Design Concepts, Wiley Dreamtech, 2004
2. Ghezzi C and M. Jazayeri, Programming Language Concepts, 3rd Edn, Wiley.1997
3. Kenneth C Louden, Programming Languages: Principles and Practice, 3rd Edn., Cengage Learning, 2011.
4. Pratt T W, M V Zelkowitz, and T. V. Gopal, Programming Languages: Design and Implementation, 4th Edn., Pearson Education, 2001
5. R W Sebesta, Concepts of Programming Languages, 11th Edn., Pearson Education, 2015
6. Ravi Sethi, Programming Languages: Concepts & Constructs, 2nd Edn., Pearson Education, 2006
7. Tucker A B and R E Noonan, Programming Languages: Principles and Paradigms, 2nd Edn,McGraw Hill, 2006.

Course Plan			
Module	**Contents**	**Hours**	**End Sem. Exam Marks**
I	Names, Scopes and Bindings:- Names and Scopes, Binding Time, Scope Rules, Storage Management, Binding of Referencing Environments. Control Flow: - Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion, Non-determinacy.	7	15 %
II	Data Types:-Type Systems, Type Checking, Records and Variants, Arrays, Strings, Sets, Pointers and Recursive Types, Lists, Files and Input/Output, Equality Testing and Assignment.	7	15 %
FIRST INTERNAL EXAM			
III	Subroutines and Control Abstraction: - Static and Dynamic Links, Calling Sequences, Parameter Passing, Generic Subroutines and Modules, Exception Handling, Co-routines.	7	15 %
IV	Functional and Logic Languages:- Lambda Calculus, Overview of Scheme, Strictness and Lazy Evaluation, Streams and Monads, Higher-Order Functions, Logic Programming in Prolog, Limitations of Logic Programming.	7	15 %
SECOND INTERNAL EXAM			
V	Data Abstraction and Object Orientation:-Encapsulation, Inheritance, Constructors and Destructors, Aliasing, Overloading, Polymorphism, Dynamic Method Binding, Multiple Inheritance. Innovative features of Scripting Languages:-Scoping rules, String and Pattern Manipulation, Data Types, Object Orientation.	7	20 %
VI	Concurrency:- Threads, Synchronization. Run-time program Management:- Virtual Machines, Late Binding of Machine Code, Reflection, Symbolic Debugging, Performance Analysis.	7	20 %
END SEMESTER EXAM			

Question Paper Pattern (End semester exam)

1. There will be ***FOUR*** parts in the question paper – **A, B, C, D**
2. **Part A**
   a. **Total marks : 40**
   b. ***TEN*** questions, each have **4 marks**, covering **all the SIX modules** (***THREE*** questions from **modules I & II**; ***THREE*** questions from **modules III & IV**; ***FOUR*** questions from **modules V & VI**).
   All the TEN questions have to be answered.
3. **Part B**
   a. **Total marks : 18**
   b. ***THREE*** questions, each having **9 marks**. One question is from **module I**; one question is from **module II**; one question ***uniformly*** covers **modules I & II**.
   c. ***Any TWO*** questions have to be answered.
   d. Each question can have ***maximum THREE*** subparts.
4. **Part C**
   a. **Total marks : 18**
   b. ***THREE*** questions, each having **9 marks**. One question is from **module III**; one question is from **module IV**; one question ***uniformly*** covers **modules III & IV**.
   c. ***Any TWO*** questions have to be answered.
   d. Each question can have ***maximum THREE*** subparts.
5. **Part D**
   a. **Total marks : 24**
   b. ***THREE*** questions, each having **12 marks**. One question is from **module V**; one question is from **module VI**; one question ***uniformly*** covers **modules V & VI**.
   c. ***Any TWO*** questions have to be answered.
   d. Each question can have ***maximum THREE*** subparts.
6. There will be ***AT LEAST* 50%** analytical/numerical questions in all possible combinations of question choices.