BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
HYDERABAD CAMPUS
FIRST SEMESTER 2013 – 2014
Course Handout (Part II)

01.08.13

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No: **CS F301**
Course Title: **Principles of Programming Languages**
Instructor-in-charge: **Dr. Aruna Malapati (arunam@bits-hyderabad.ac.in)**

1. Objective

The course provides the students with information about programming paradigms and basic concepts used in programming languages. The objective of this course is to bring together different aspects of various languages and classify their principles.

2. Scope

This course is aimed at making the student familiar with the general concepts common to all programming languages so as to facilitate learning new languages. Language paradigms (i.e., Logic, Functional, Procedural, and Object Oriented) are compared and implementation strategies are discussed.

3.a. Text Book

T1. **Ravi Sethi**, **Programming Languages - Concepts and Constructs**
Pearson Education. Low Price Edition. 2003

3.b. Reference Books

R1 Sebesta , Concepts of programming languages
R2 Michael L.Scott, Programming Language Pragmatics 3rd edition
R3 David A. Watt, Programming Language Design Concepts- John Wiley & Sons.

Research topics:

1. **Research issues in programming languages**
2. **Programming Languages for High Performance Computing**

4. Course Plan

4.a. Modules and Learning Objectives

Module	Title	Learning Objective(s)
M1	**Introduction to Progg. Languages**	To understand common features in programming languages and their foundational principles.
M2	**Scope and concurrency**	To understand the underlying principles of how different languages define scope
M3	**Aspects of runtime environments**	To understand the intricacies of managing the runtime programming stack and its models.

M4	**Programming paradigms**	To explore and compare the main alternative paradigms for high-level programming. It considers important modern paradigms such as functional programming, logic programming and concurrent programming, and compares these with the mainstream paradigms of imperative programming and object-oriented programming.
M5	**Applications of principles of programming languages**	To understand the importance of this course with respect to its applications like program verification, testing etc.

4.b. Lecture Schedule

Sl No	Topic	Learning Objective	No of Lectures	Module	Reading
1.	Introduction to Programming Languages	Familiarize with concepts of various programming languages design criteria, concepts and paradigms	1	M1	T1 Ch1 R1 Ch 1 R2 Ch1
2.	Core issues in Language design	Control Abstraction	3	M1	T1 Ch 3
		Data Types and Data Abstraction	3	M1	T1 Ch 4 R1 Ch 6
3.	Programming Languages syntax	Regular Expressions, BNF,EBNF	2	M1	T1 Ch 2
4.	Binding and scope	Static and Dynamic Scoping	4	M2	T1 Ch 5 R1 Ch 5 R2 Ch 3
5.	Procedural Abstraction	Parameter passing mechanisms Call by value, Reference, Name, Call by Value-Result, Result	4	M2	T1 Ch 5 R1 Ch 9 R2 Ch 8.3
6.	Concurrency	Program and process	4	M2	R 1 Ch 13 R2 Ch 12
7.	Runtime environments	Memory management in programming languages	3	M3	Class Notes
8.	Functional paradigm	Elements of functional programming	3	M4	T1 Ch 8,9,10 R1 Ch 15 R2 Ch 10
9.	Formal elements of lambda calculus	Reduction, Static types and lambda calculus, Type assignment,	3	M4	T1. Ch14 Class Notes
10.	Logic programming paradigm	Formal elements of logic programming and programming tasks that explore the logic paradigm	3	M4	T1 Ch 11 R1 Ch 16 R2 Ch 11
11.	Scripting as a paradigm	Problem domains, Scripting in WWW, Innovative features	3	M4	R2 Ch 13

12.	Domain specific languages(DSL)	Problems with DSL, Implementing DSL	3	M4	Class Notes
13.	Applications of the principles of programming languages	Applications to each paradigm	2	M5	Class Notes
Total number of classes Planned			**41**		

5. Evaluation Scheme

5.a. Major Components

Component	Mode	Duration	Date	Weight
Assignments	Take Home		To be announced in class	**10%**
Test 1	Closed Book	60min	27/9, 8.00 -- 9.00 AM	**25%**
Test 2	Closed Book	60min	12/11, 8.00 -- 9.00 AM	**25%**
Comprehensive	Partly Open Book *	3 hours	05/12, 2.00 – 5.00 PM	**40%**

***Prescribed Text book, References and only Hand-Written Notes Permitted.**

5.b. Timeliness

- Assignments are to be completed in time with no postponements.
- Submissions 24 hours from deadline will have a penalty of 2 Marks per day.

6. Notices: All notices related to the course will be displayed on the **CSIS Notice Board**, and / or course website. Make ups shall be granted on prior permission and only to genuine cases.

7. Chamber Consultation: Monday 9th hour (4-5Pm)

Instructor-in-charge
CS F301