**Birla Institute of Technology & Science, Pilani – K K Birla Goa Campus**
**First Semester: 2013-2014**
**Course Handout (Part II)**

In addition to Part -I (General Handout for all courses appended to the Time-Table) this portion gives further details pertaining to the course.

**August 6, 2013**

***Course No.*** **: CS/IS F301**

***Course Title*****: Principles of Programming Languages.**

***Instructor-in-Charge*****: RAMPRASAD JOSHI.**
***Instructor*****: Rajendra Kumar Roul.**

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**Course Description:**

Introduction to programming language constructs, programming paradigms. Introduction to language description; syntax and semantics. Introduction to language processors. Procedural languages. Object-oriented languages. Functional languages. Scripting languages. Web-programming, extension and embeddable programming. Programming language pragmatics, basic concepts: control flow; values and types, variables, aggregates, storage classes, pointers and references; bindings and scope; procedural abstraction and stack. Introduction to data abstraction. Introduction to concurrency, basic issues.

**1. Scope & Objective:**

This course aims at understanding the fundamental concepts and constructs of programming language paradigms and particularly highlights several languages, which exhibit these features. It also focuses on the central features of high-level languages (like scope, environment, data types, control structures etc.), and introduces the basic preparation for compiler design. The primary objective is to emphasize design and implementation issues for the systems-programmer rather than on language features from a programmer's point of view. It also aims at providing the student adequate background so as to enable him / her to gain good conceptual understanding needed for further studying the science and tools of compiler writing.

**2. Text Book:**

$T_1$**.** Michael L. Scott. *Programming Language Pragmatics (3/e).* Morgan Kaufmann/Elsevier Indian Reprint, 2010.

**3. Reference Books:**

$R_1$**.** Ravi Sethi. *Programming Languages: Concepts and Constructs, (2/e).* Pearson Education, 2002.

$R_2$**.** David A. Watt. *Programming Language Design Concepts, (1/e).* Wiley India, 2004.

**4. Course Plan:**

| Lect | Topics | References |
|---|---|---|
| | **Module I: Introduction** | |
| 1-3 | Basics: the questions to be asked and answered; language processors; various languages and paradigms | Notes |
| 4-5 | Language Description | $R_1$, Ch 2; Notes |
| | **Module II: Basic Pragmatics** | |
| 6-10 | Control Flow: assignment, expression evaluation, control constructs. Iteration and recursion. | $T_1$ Ch 6; $R_1$ Ch 3; $R_2$ Ch 9. |
| 11-15 | Values and Types: type checking, pointers and references, layouts and size, aggregates. | $T_1$ Ch 7; $R_1$ Ch 4; $R_2$ Ch 2,3. |
| 16-20 | Data Abstraction and Object-Orientation I: grouping of data and operations. | $T_1$ 9.1-9.3; $R_1$ Ch 6; $R_2$ Ch 6. |
| 21-25 | Names, Scopes, and Bindings: blocks and subroutines, static and dynamic scoping. | $T_1$ Ch 3; $R_1$ 5.1-5.4, 5.6; $R_2$ Ch 4, 5.1. |
| 26-30 | Functional Programming: Lisp. | $T_1$ Ch 10; Notes. |
| | **Module III: Implementation Issues** | |
| 31-35 | Subroutines and Control Abstraction: procedure activation and stacks, handling recursion and nested calls. | $T_1$ 8.1-8.3; $R_1$ 5.5; $R_2$ 5.2-5.3. |
| 36-40 | Object-Orientation II: dynamic binding, polymorphism, generic abstraction. Introduction to Concurrency. | $T_1$ 8.4-8.8, 9.4-9.7; $R_1$ Ch 7. |
| 41-45 | Introduction to Processor Architectures: data representation, instruction sets, multithreading, multicore architectures, pipelining, register allocation. | $T_1$ Ch 5 (CD)[1]. |
| | **Module IV: Demonstrations and Tutorials** | |
| 1-4 | Analysis of stages in the translation from program design to execution. | Notes, manuals. |
| 5-14 | Introduction to regular-expressions and string processing | Notes, manuals. |

**5. Evaluation Scheme:**

| # | Evaluation Component | Weightage | Date | Time | Remark |
|---|---|---|---|---|---|
| **1** | Test-1 | 25% | 18/09 | 1600-1700 | Closed Book |
| **2** | Test-2 | 25% | 28/10 | 1600-1700 | Open Book |
| **3** | Compre | 50% | 2/12 | FN | Partly Open Book[2] |

**6. Chamber Consultation:** Thursdays 1130-1300 hrs.

**7. Notices:** All notices concerning this course will be mainly declared in the class and tutorial sessions. Attempt will be made to use photon and dc for quick communication, but no guarantees. Also see **CS/IS** notice board. Keep an eye on the ID/ARC notices as well. To clarify matters, use rsj@goa.bits-pilani.ac.in.

**8. Make-up Policy:** Prior permission is needed. Otherwise, zero will be awarded for that component without make-up. Granting make-up is the sole discretion of the IC.

**Instructor-In-Charge, CS/IS F301**

[1] Some portion of the material of the textbook $T_1$ is **not in actual print, but made available in the CD accompanying it**, in the copy in our possession. Make sure you get either in print or in print *and* CD all the content.

[2] **Details will be declared in the class at the end of classwork.**