INSTRUCTION DIVISION
FIRST SEMESTER 2014-2015
Course Handout (Part II)

01/08/2014

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

Course Number : CS F111
Course Title : Computer Programming
Instructor-in-charge : ASMA RANI
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1. Objective:

The primary goals of the course are to introduce:

- Basic representation of data and how to process data using the representation inside a computer.
- Techniques for specifying data, operations on data, and problem solving using a programming language.
- Systematic techniques and approaches for constructing programs.

2. Scope:

The course covers the following topics: Basic Model of a Computer; Problem Solving – Basic Computing Steps and Flow Charting (Assignment, Sequencing, Conditionals, Iteration). Programming Constructs – Expressions, Statements, Conditionals, Iterators/Loops, Functions/Procedures; Data Types – Primitive Types, Tuples, Choices (Unions or Enumerations), Lists/Arrays, Pointers and Dynamically Allocated Data. Input output and Files.

While the topics are taught using a specific language, the intent of the course is to teach a programming methodology, and not a programming language. There is also a laboratory component that involves development and testing of iterative and procedural programs using bounded and unbounded iterations, function composition, random access lists, sequential access lists, dynamically allocated lists, and file access.

3. Text and Reference:

3 (a) Text Book:

TB1. J.R. Hanly and E.B. Koffman, *Problem Solving and Program Design in C*. 5th Edition. Pearson Education 2007.

3 (b) Reference Books:

RB1. Yale Patt, Sanjay Patel. *Introduction to Computing Systems: From bits & gates to C & beyond*, Second edition, McGraw Hill.

RB2. Behrouz A Forouzan & Richard F Gilberg . *Computer science A structured programming approach using C*. Cengage Learning 3rd Edition

RB3. Brian W. Kernighan, Dennis Ritchie. *The C Programming Language*. Prentice Hall. 2nd Edition.

4(a) Course Plan:

Module	Theme	Learning Objective
I	Basic data, data types, and data representation	To understand how to define, represent, and process basic data.
II	Analyzing, designing, and managing a process or program for any given problem.	To diagrammatically understand and visualize an algorithm using boxes of various kinds. This representation gives a step by step insight to a solution of a given problem.
III	Basic Problem Solving – Structured Programming	To understand constructs of structured programming including conditionals and iterations
IV	Advanced Problem Solving – Program Structuring and Structured Data	To understand how to structure complex data and how to systematically structure large programs
V	User Defined Data and Dynamic Data	To understand how users can define the structure and operations of new forms of data using known forms
VI	Advanced Topics – File I/O and Recursion	To understand recursive programming and to understand how to access files and contents of files

4(b) Lecture Schedule [Legends: TB – Text Book; RB - Reference Book (as mentioned in 3(b) above)]

Lecture No	Topic	Reference
1	Introduction to the subject; teaching Pedagogy. Basics of Computing – Data and Computation. Model of a computer	**RB1:** 1.1 to 1.7
2-5	Binary number system- Unsigned Integers: Binary representation; word size; extension; range. Signed Integers: Binary representation in (a) Sign magnitude, (b) one's complement, and (c) two's complement, Advantages, disadvantages, sign extension, and range of signed integers in all three respective representations. Overflow in two's complement form. Floating point number representation, Character, string, and other data representation. Conversions among decimal, binary, hexadecimal, and octal number systems (for signed, unsigned, and floating point numbers)	**RB1:** 2.1, 2.2.12.3, 2.5.3, 2.7.2, 2.7.3, 2.4,2.7.4

6-7	Arithmetical and logical operations on binary numbers	**RB1:** 2.5, 2.6
8-9	Flow Charts: Graphical Symbols, Examples, Sequential and Conditional Constructs, Loops; Searching and Sorting	Lecture Slides
9-10	Memory and Variables – Locations, Addresses, Definitions and Declarations; Program structure	**TB1:** 2.1, 2.2, 2.3, 2.4
11-13	Data types, Operators, and expressions, Enumerated Data Types, Expression evaluation: Operator Precedence and Associatively, Expression evaluation with different data types: type conversion (implicit and explicit)	**TB1:** 2.5, 7.3
14	Logical expressions and evaluation	**TB1:** 4.1, 4.2
15-18	Sequential and Conditional execution; Control Statements (different forms of conditional statements). Conditional statements: different forms of nested conditional constructs. Multi way branching: selection control mechanism using switch statement, Problem solving using Iterative Constructs: While statement, For Statement, Do-While Statement	**TB1:** 4.3,4.7,4.8, 5.1-5.8
19-22	Structure data: One dimensional random access lists, Multi-dimensional random access lists: declaring, initializing, and accessing list elements, Searching: Linear and Binary search, Sorting: selection and bubble sort	**TB1:** 8.1, 8.2, 8.3, 8.6,8.7
23-25	Modularity and reuse: Functions with return types/without return types, arguments/without arguments, Parameter passing: Pass by value, scope of data	**TB1:** 3.1, 3.4, 3.5, 6.1-6.4
26-28	Data type: Pointers, referencing a memory location and obtaining a value stored at that location, Random access lists and pointers, Pointer arithmetic	**TB1:** 6.1, Lecture Slides
29-31	Structured data: strings, Standard Library string functions: design and implementation	**TB1:** 9.1 – 9.7
32-33	User defined data type: structure	**TB1:** 11.1 - 11.3
34-37	Memory Layout – Implicit vs. Explicit Allocation; Static vs. Dynamic Allocation; Motivation for Dynamic Allocation, Linked Lists: Node structure, inserting , searching, deleting a node	**TB1:** 14.1-14.4
38-39	Files and File I/O: External Storage, Files and File Systems; File Operations and I/O Operations;	**TB1:** 12.1, 12.2
40	Divide and Conquer – Design using Recursion ; Recursive procedures; Recursion vs. Iteration	**TB1:** 10.1-10.4

5. Evaluation Scheme:

Component	Duration	Weightage	Date, Time & Venue	Remarks
Mid-Sem Test	90 min	22 %	13/10 2:00 - 3:30 PM	Closed Book
Online Test	90 min	20%	To be announced in the class	Open Book
Quizes	15 mins each	18 %	To be announced in the class	Closed Book
Lab	-------	5%	Every Week	Closed Book
Comprehensive Examination	120 min	35 %	13/12 FN	Open Book

6. Make-up Policy

- No make-ups will be given for Quizes and online Test.
- Make-ups for written examinations may be granted for emergency cases like hospitalization. Prior Permission of the Instructor-in-Charge is required to get make-up for the mid-term test. Only on producing documentary proof of possible absence, which proves that student would be physically unable to appear for the test/exam, the decision of granting the make-up will be taken.
- Prior Permission of Dean, Instruction Division is usually required to get make-up for the comprehensive exam.
- Instructor / Dean's decision in the matter of granting Make-up would be final.

7. Chamber Consultation Hour: Friday 4:00P.M.-5:00 P.M. in 6121-B.

8. Notices: All notices for the course will be displayed on the NAB notice board only. Optionally, if there is a need, mail would be used on short notice – only BITS Pilani mail would be used.

Instructor-in charge
CS F111