Birla Institute of Technology & Science, Pilani, K. K. Birla Goa Campus

Second Semester 2017-2018

Course Handout (Part-II)

CS F111 Computer Programming

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 Number : **CS F111**
Course Title : **Computer Programming**
Instructor-In-charge : **Dr. BIJU K RAVEENDRAN (biju@goa.bits-pilani.ac.in)**
CP TEAM : **Mr. Mahadev A Gawas (mahadev@goa.bits-pilani.ac.in)**
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1. Objective:

The primary goals of this course include:

(A) Understanding the basic representation of data and efficient ways to process represented data inside a computer.

(B) Systematic techniques and approaches for constructing programs to process the represented data using a programming language.

2. Scope:

This course teaches a beginner how to do programming with computers. The course starts with basic representation of data and operations with represented data. The course covers problem solving with the help of flowcharting, algorithms (Assignment, sequencing, conditionals and Iterations) and C programming. The problem solving using programming covers programming constructs like Expressions, Statements, Conditional statements, Iterators / Loop constructs and Functions / Procedures. This course also covers Data types – Primitive types, Tuples, Choices (Unions or Enumerations), List / Arrays, Pointers and Dynamic allocated data. This course covers files (input and output) and recursion.

This course has no pre-requisites and the expected outcome of the course is "systematic way of" programming (in C). This course emphasize on design of (arguably correct) algorithms as solutions to problems. It also focuses on using abstraction and data organization for implementing algorithms and analyzing the efficiency of the implementations. C will be used as a vehicle for demonstrating and practicing the techniques.

There is also a laboratory component that involves development and testing of iterative and procedural programs using bounded iteration, unbounded iteration, recursion, function composition, random access lists, sequential access lists, dynamically allocated lists and file accesses.

3. Text and Reference Books

(A) Text Book

J R Hanly and E B Koffman, "Problem Solving and Program Design in C", Pearson Education, Fifth Edition 2007.

(B) Reference Books

Brian W Kernighan and Dennis M Ritchie, "The C programming language", Prentice Hall India, 2nd Edition, 1988.

R.G. Dromey, "How to solve it by Computer", Pearson, 2006.

4. Lecture Schedule:

Lect	Learning Objective	Topics	Reference
1	Introduction	Introduction to Computers and Computer Programming course, Basics of Computing – Data and Computation, Model of a computer.	
2 – 3	How to Write a Basic C - program	Structure of a simple C program using "Hello World" program. Compilation and Execution of the program	T1 Sec. 2.2
4	Basic Data and Expressions	Data Types - Operations and Representation – Numbers – Integers and Integer Operations	T1 Sec. 2.2, Class Notes
5	Basic Data and Expressions	Memory and Variables – Locations, Addresses, Definitions and Declarations	T1 Sec. 2.2, Class Notes
6 – 7	Data types, state and interaction	Data Types – Boolean Values and Boolean Operations; Sets and Bit Vectors - Bit Vector Operations; – Characters and Character Sets;	T1 Sec. 2.2, Class Notes

8	Data types and Expression evaluation	Expression Evaluation – Associativity and Precedence. Conditional Expression	T1 Sec. 2.5, Class Notes
9	Data types and Expression evaluation	Variables and Assignment – forms of assignment (increment/decrement), sequencing	T1 Sec. 2.3
10 – 11	Data types and Expression evaluation	Data Types –Real vs Rational Numbers; Accuracy, Precision, and Range. Floating Point Representation, Single and Double Precision	Class Notes
12	Data types and Expression evaluation	Data Types – Type Conversion – Implicit and Explicit	T1 Sec. 7.1
13	Basic Input / Output	Basics of Input / Output – Character and Buffered I/O. External interface for the program –Compilation & Execution	T1 Sec. 2.3, 2.6, 2.7
14 – 16	Basic Problem solving – Structured Programming	Problem Solving – Sequential and Conditional Execution; Flow Charting; Pre-conditions and Post-conditions. Statements – Sequential and Conditional Statements. User Defined Data – Enumerated Data Types.	T1 Ch. 4
17 - 21	Basic Problem solving – Structured Programming	Problem Solving – Repetitive Execution – Bounded, Unbounded, and Infinite Iterations; Flow Charting – Entry and Exit; Correctness Arguments – Invariance and Termination. Forms of Iterative Statements;	T1 Ch. 5
22	Basic Problem solving – Structured Programming	Goto Statements – Structured Programming	Class Notes
23 – 25	Advanced Problem Solving – Program Structuring and Structured Data	Data Types – Structured Data - Lists – Random Access and Locality – Indexing; Iterating over lists – Ordering (Sorting) and Searching; Character Arrays and Strings;	T1 Ch. 8 T1 Ch. 9
26 – 28	Advanced Problem solving – Program Structuring and Structured Data	Data Types – Tuples and Choices (Structures and Union) – Representation and Access; Multiple Lists vs Lists of Tuples; Locality and Iterations.	T1 Ch. 11
29 – 31	Advanced Problem Solving – Program Structuring and Structured Data	Problem Solving – Modularity and Reuse – Procedures and Functions –Types - Parameters and Arguments – Local data vs. Non-local data – Composition of Functions	T1 Ch. 6
32 - 33	User Defined Data and Dynamic Data	User Defined Data Types – Abstract Data Types – Structure & Implementation of ADTs - Examples (Access Restricted Lists)	T1 Ch. 13, Class Notes
34 - 35	User Defined Data and Dynamic Data	Memory Layout – Implicit vs. Explicit Allocation; Static vs. Semi-static vs. Dynamic Allocation; Motivation for Dynamic Allocation – Cursors and Pointers. Dynamically allocated Lists. – Examples	T1 Sec. 14.2 – 14.7
36 - 38	User Defined Data and Dynamic Data	Pointers, Addresses and Address Arithmetic; Parameter Passing: Value and Reference. Multiple levels of Indirection	T1 Sec. 14.1
39 - 41	Advanced Topics – File I/O and Recursion	Recursive Programming – Divide and Conquer; Recursive procedures; Recursion vs. Iteration – Time and Space. Tail Recursion	T1 Ch. 10
42 - 43	Advanced Topics – File I/O and Recursion	Files and File I/O: External Storage, Files and File systems; File Operations and I/O Operations;	T1 Ch. 12

5. Evaluation:

Component	Mode	Date	Marks
Mid Semester Test	Close Book	07th March, 2018, 11:00 A.M. – 12:30P.M	60
Online Test(s)	Open Book	------	82
Comprehensive	Close Book	05th May, 2018, After Noon	110
Lab Evaluation	Open Book	Every Week (Best 8 Lab Marks)	48

6. Malpractice Regulations:

1. Any student or team of students found involved in mal practices in working out Lab / Online will be awarded negative marks equal to the total weightage of the Lab / Online and will be blacklisted.
2. Any student or team of students found repeatedly – more than once across all courses – involved in mal-practices will be reported to the Disciplinary Committee for further action. This will be in addition to the punishment mentioned above.
3. A mal-practice - in this context - will include but not be limited to:
   - Submitting some other student's / team's solution(s) as one's own;
   - Copying some other student's / team's data or code or other forms of a solution;
   - Seeing some other student's / team's data or code or other forms of a solution;
   - Permitting some other student / team to see or to copy or to submit one's own solution;
   - OR other equivalent forms of plagiarism wherein the student or team does not work out the solution and/or uses some other solution or part thereof (such as downloading it from the web).
4. The degree of mal-practice (the size of the solution involved or the number of students involved) will not be considered as mitigating evidence. Failure on the part of instructor(s) to detect mal-practice at or before the time of evaluation may not prevent sanctions later on.

7. Course Notices: All notices pertaining to this course will be displayed on the course photon (http://photon) page.

8. Chamber Consultation Hour: **To be announced in the Class room**

9. Makeup Policy:

- No makeup will be given for the lab component.
- Permission of the Instructor-in-Charge is required to take a make-up
- Make-up applications must be given to the Instructor-in-charge personally.
- A make-up test shall be granted only in genuine cases – based on Instructor's judgment - the student would be physically unable to appear for the test.
- In case of an unanticipated illness preventing a student from appearing for a test, the student must present a Medical Certificate from BITS medical centre.
- Requests for make-up for the comprehensive examination – under any circumstances – can only be made to Faculty In-charge, Instruction Division.

Dr. Biju K Raveendran
Instructor–In-Charge, CS F111