 **COMSATS University Islamabad**

**Department of Computer Science**

**Course Syllabus**

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| **Course Information** | | | | |
| Course Code: **CSC103** Course Title: **Programming Fundamentals**  Credit Hours: **4(3,1)** Lecture Hours/Week: **3**  Lab Hours/Week: **3** Pre-Requisites: **None** | | | | |
| **Catalogue Description:** | | | | |
| This course emphasis the basic concepts used in programming. The topics include: Computer Programming; Basic Syntax & Semantics of a Higher-Level Language; Conditional & Iterative Control Structures; Functions & Parameter Passing; Recursion; Pointers; Arrays; String Processing; Structs; Debugging; Modern Programming Environments; and File I/O. | | | | |
| **Text and Reference Books** | | | | |
| **Textbook:**  1. C How to Program, 7th Edition by Deitel & Deitel, Pearson.  **Reference Books:**   1. “C++ Programming: From Problem Analysis to Program Design” by D.S. Malik 2. “Problem Solving and Program Design in C” by Hanly & Koffman | | | | |
| **Week wise Plan:** | | | | |
|  | **Lecture #** | **CDF**  **Unit #** | **Topics Covered** | **Reading Material** |
| 1. | 1 | Computer Programming: Fundamental Concepts, Programming Paradigms: Structured, Object-Oriented and Functional Programming. | Deitel: Ch1 |
| 2. | 1 | Introduction to Higher-Level Language, Creating and Saving Source File, Compile-link-run cycle, and Types of Errors (Syntax, Logic, Run-Time). | Deitel: Ch1 |
| 3. | 2 | Basic Syntax & Semantics of a Higher-Level Language (Comments, Special Symbols, Reserved Words, Identifiers); Documentation, and Program Style. | Deitel: Ch2 |
| 4. | 2 | Variables: Allocating Memory with Named Constants & Variables, Putting Data into Variables, Declaring & Initializing Variables;  Simple I/O: Input (Read) Statement, and Reading a Single Character. | Deitel: Ch2 |
| 5. | 2 | Data Types, Expressions & Assignments, Arithmetic Operators, Order of Precedence, and Type Conversion. | Deitel: Ch2 |
| 6. | 2 | Increment & Decrement Operators; and Simple I/O: Output & Formatted Output. | Deitel: Ch2 |
| 7. | 3 | Control Structures; Relational Operators, Relational Operators Data Type, Logical Operators & Logical Expressions, and Order of Precedence. | Deitel: Ch2 |
| 8. | 3 | Selection: (if and if-else), Compound Statements, and Multiple | Deitel: Ch3 |

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|  |  |  | Selections. |  |
| 9. | 3 | Selection: Short-Circuit Evaluation, Conditional Operator, and Switch Structure. | Deitel: Ch3 |
| 10. | 3 | Iterative Control Structure: While Loop (Designing While Loop), Counter-Controlled While Loops, | Deitel: Ch4 |
| 11. | 3 | Sentinel-Controlled While Loops, Input-validation loops, and FlagControlled While Loops. | Deitel: Ch4 |
| 12. | 3 | For Looping Structure, do…While Looping Structure, *break* and *continue* Statements. | Deitel: Ch4 |
| 13. | 5 | Methods: main() Method, Using predefined library Methods (e.g. Math, Character) (calling and passing arguments). | Deitel: Ch5 |
| 14. | 5 | Methods: User Defined Methods, Defining a Method, Calling a Method, Void Method,. | Deitel: Ch5 |
| 15. | 4 | Methods: Method Returning Values, Passing Argument by Value, Method-Call Stack & Activation Records, | Deitel: Ch5 |
| 16. | 4 | Methods: Scope of Variables (The concept of Local vs Global identifiers) | Deitel: Ch5 |
| 17. | 4 | Recursion: Introduction, Concepts, Examples, Recursion VS. Iteration, Method Call Stack, and Recursive Backtracking. | Deitel: Ch5 |
| 18. | **Mid Term Exam** | | |
| 19. |
| 20. | 4 | Arrays: Declare and Initialize an Array, Accessing Array Elements, Specifying Array Size during Program Execution, Array Length, | Deitel: Ch6 |
| 21. | 5 | Processing One-Dimensional Arrays, and Array Index Out of Bounds Exception. | Deitel: Ch6 |
| 22. | 5 | Declaring Arrays as Formal Parameters to Methods, Arrays as Parameters to Methods, Methods Returning Arrays, Variable-Length Argument Lists, and Command-Line Arguments. | Deitel: Ch6 |
| 23. | 5 | Two Dimensional Arrays: Accessing Array Elements, Initialization, and Processing Two Dimensional Arrays. | Deitel: Ch6 |
| 24. | 5 | Passing Two-Dimensional as Parameter to a Method, and Multidimensional Arrays. | Deitel: Ch6 |
| 25. | 5 | Declaring and initializing a pointer, the indirection/ dereference operator, pointers’ arithmetic and relationship with arrays | Deitel: Ch6 |
| 26. | 6 | Input/output function parameters OR pass-by-value vs pass-byreference, const modifier | Deitel: Ch7 |
| 27. | 6 | String: Simple String Methods, Comparing String, Substring Methods, and Conversion between String & Numbers | Deitel: Ch8 |
| 28. | 6 | User-defined types, Define structure, create and use structure variables, component selection operator, passing structs to functions as input/output parameters | Deitel: Ch10 |
|  | 29. | 6 | Returning struct output from a function, Create struct arrays, pointer to structs, parallel arrays and array of structs | Deitel: Ch10 |
| 30. | 6 | File I/O: Files & Streams, Batch mode of program execution, File pointer, initializing and validating a file pointer, file opening modes, closing file | Deitel:Ch11 |
| 31. | 6 | EOF and Endfile-controlled loop, Reading file character by character, reading formatted input from a file, writing formatted output to a file, file handling applications | Deitel:Ch11 |
| 32. | 7 | Intro to Binary files, random access a binary file using fseek, fread and rewind, write a binary file using fwrite | Deitel:Ch11 |

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|  | **Final Term Exam** | | | | | | |
| **Students Outcomes (SOs)** | | | | | | | |
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|  | **S.#** | **Description** | | | | |  |
| 1 | Apply knowledge of computing fundamentals, knowledge of a computing specialization, and mathematics, science, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements | | | | |
| 2 | Identify, formulate, research literature, and solve *complex* computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines | | | | |
| 3 | Design and evaluate solutions for *complex* computing problems, and design and evaluatesystems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations | | | | |
| 4 | Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to *complex* computing activities, with an understanding of the limitations | | | | |
| 5 | Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings. | | | | |
| **Course Learning Outcomes (CLO)** | | | | | | | |
|  | **Sr.#** | | **Unit #** | **Course Learning Outcomes** | **Blooms**  **Taxonomy**  **Learning Level** | **SO** |  |
| **CLO’s for Theory** | | | | | |
| CLO-1 | | 1-2 | Explain the fundamental concepts of programming. | *Understanding* | 1 |
| CLO-2 | | 3-5 | Employ basic programming constructs using a programming language. | *Applying* | 2,4 |
| CLO-3 | | 6 | Handle programs utilizing arrays, pointers, structures. | *Applying* | 2,4 |
| CLO-4 | | 7 | Apply the file I/O using a programming language. | *Applying* | 2,4 |
| **CLO’s for Lab** | | | | | |
| CLO -5 | | 3-6 | Implement a program using basic programming constructs. | *Applying* | 2,4 |
| CLO -6 | | 1-7 | Build a medium size application in a team environment. | *Creating* | 2-5 |

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| **CLO Assessment Mechanism** | | | | | | | | | | | | | | | | | | |
|  | **Assessment Tools** | | | **CLO-1** | | **CLO-2** | | | **CLO-3** | | **CLO-4** | | **CLO-5** | | | **CLO-6** | |  |
| Quizzes | | | Quiz 1 | | Quiz 2 | | | Quiz 3 | | Quiz 4 | | - | | | - | |
| Assignments | | | Assignment  1 | | Assignment  2 | | | Assignment  3 | | Assignment  4 | | Lab Assignments | | | - | |
| Mid Term Exam | | | Mid Term Exam | | Mid Term Exam | | | Mid Term Exam | | - | | - | | | - | |
| Final Term Exam | | | Final Term Exam | | | | | | | | | | | | | |
|  | Project | | | - | | - | | | - | | - | | - | | | Lab Project | |  |
| **Policy & Procedures** | | | | | | | | | | | | | | | | | | |
| * **Attendance Policy:** Every student must attend 80% of the lectures as well as laboratory in this course. The students falling short of required percentage of attendance of lectures/laboratory work, is not allowed to appear in the terminal examination.      * **Course Assessment:**      |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | Quizzes | Assignments | Mid Term Exam | Terminal Exam | Total | | **Theory (T)** | 15 | 10 | 25 | 50 | 100 | | **Lab (L)** | - | 25 | 25 | 50 | 100 | | **Final Marks (T+L)** |  | **(T/100) \*75 + (L/100) \*25** | | |  |      * **Grading Policy:** The minimum passing marks for each course is 50% (In case of LAB; in addition to theory, student is also required to obtain 50% marks in the lab to pass the course). The correspondence between letter grades, credit points, and percentage marks at CUI is as follows: | | | | | | | | | | | | | | | | | | |
| **Grade** | | | **A** | **A-** | **B+** | | **B** | **B-** | | **C+** | **C** | **C-** | | **D+** | **D** | | **F** | |
| **Marks** | | | >= 85 | 80 - 84 | 75 - 79 | | 71 - 74 | 68 - 70 | | 64 - 67 | 61 - 63 | 58 - 60 | | 54 - 57 | 50-53 | | < 50 | |
| **Cr. Point** | | | 3.67-  4.00 | 3.34-  3.66 | 3.01-  3.33 | | 2.67-  3.00 | 2.34-  2.66 | | 2.01-  2.33 | 1.67-  2.00 | 1.31-  1.66 | | 1.01-  1.30 | 0.10-  1.00 | | 0.00 | |
| • | | **Missing Exam:** No makeup exam will be given for final exam under any circumstance. When a student misses the mid-term exam for a legitimate reason (such as medical emergencies), his grade for this exam will be determined based on the Department policy. Further, the student must provide an official excuse within one week of the missed exam. | | | | | | | | | | | | | | | | |
| • | | **Academic Integrity:** All CUI policies regarding ethics apply to this course. The students are advised to discuss their grievances/problems with their counsellors or course instructor in a respectful manner. | | | | | | | | | | | | | | | | |
| • | | **Plagiarism Policy:** Plagiarism, copying and any other dishonest behaviour is prohibited by the rules and regulations of CUI. Violators will face serious consequences. | | | | | | | | | | | | | | | | |