# Sarhad University of Science & Information Technology, Peshawar

## **Department of Computer Science and IT**

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Course Code & Title: CS-116T, Programming Fundamentals- (Th)

**Credit Hours: 3-0** 

**Course Duration:** One Semester

**Credit Units: 3** 

Level: 1st Semester, 1st Year

**Prerequisites:** None

### **Course Objectives:**

The course is designed to familiarize students with the basic structured programming skills. It emphasizes upon problem analysis, algorithm designing, and program development. The objective of this course is to provide the student with the fundamental knowledge and skills to become a proficient C/C++programmer. After this course, students would be able to;

- Divide a problem into its logical set of components.
- Create a program using programming tools.
- Understand the concept of functions and their usage
- Understand the use of arrays to store lists and tables of values.
- Use pointers and Strings.
- Understand the close relationships among pointers, arrays and strings.

#### **Text Book:**

- 1. The C Programming Language, 2nd Edition by Brian W. Kernighan, Dennis M.Ritchie
- 2. Object-Oriented Programming using C++ by Tasleem Mustafa

#### **Reference Books:**

- 1. Object-Oriented Programming in C++by Robert Lafore,3<sup>rd</sup>Edition
- 2. C++ How to Program by Deitel & Deitel ,5<sup>th</sup> Edition
- 3. C How to Program, 7<sup>th</sup> Edition by Paul Deitel & Harvey Deitel
- 4. Problem Solving and Program Design in C++, 7<sup>th</sup> Edition by Jeri R.Hanly & Elliot B.Koffman

**Grading Criteria:** Mid Term Exam: 30 %

Final Term Exam: 70 %

# **Course Learning Outcomes:**

CLOs	Level of Learning (Bloom's Taxonomy)	GAs
CLO-01 State the fundamental concepts of structured programming along with problem solving techniques and analytical thinking.	C1	2
CLO-02  Demonstrate an ability to write, debug and execute programs in C++	С3	2
CLO-03 Apply loops, conditional statements, arrays, pointers, functions for evaluating and solving computing problems.	C3	4

# **Course Week Wise Plan with CLOs Mapping**

WEEK	Topics	Assignments	CLO
#		Quizzes	
1	Problem Solving. Example problems, Phases of problem solving, Analysis of problem, Identification of Data, Inputs, Process, Output. Ven-Neumann Architecture  Introduction to Programming Languages High level / Low-level Languages, Introduction to C++,		CLO-01
2	Solution Design: Flow Charts, Algorithms, Pseudo Code Development of flowcharts for simple problems.  Development of Algorithms/Pseudo Code for simple problems. Solution Verification/ Dry Run Program Development, Compilation. Simple C++ program. Program errors: Syntax / Runtime / Logic errors	Assignment #01	CLO-01
3	C++ Basics Keywords, A sample C++ program explained. Basic I/O.(cout, cin) Displaying a message, Formatting a Message, Variables, Integer Data type. Assignment Operator. Arithmetic Operators,	Quiz #01	CLO-02
4	Solution Program Conversion of mathematical formula to C++ formula. Operator precedence., Constants, Data Types, Float data. Arithmetic operations in Float. Type casting. Character Data types. Operation on character Datatype	Assignment #02	CLO-02
5	Control Structures I (Selection) Increment and Decrement Operator, Relational Operators, Logical Operators and Logical Expressions,		

	Selection: if statement,		CLO-03
6	Control Structures II (Selection) Cont		
	else-if statement, if-else statement, Conditional Operator,		CLO-03
7	Repetition I		
	While loop, Syntax, Flow Chart, Examples, Dry Run of code. While		CLO-03
	with Multiple conditions.do-while loops,		
	Repetition II		
8	For loop, Syntax, Flow Chart, Examples, Dry Run of code. Variations		CLO-03
	in For Loop.		CLO 03
9	Mid-Semester Examination	T	1
10	Repetition III		GI O 02
	Nested loop, Switch statement Break and Continue Statement		CLO-03
	Functions I		
	Definition, Role of functions, Call and Return. Library functions		CI O 03
11	(Math) User defined functions. Defining a function, Prototype, Calling a	Quiz #02	CLO-03
	function, Passing arguments to functions,		
	Returning values from functions,		
	Functions II		
10	Scope rules (local variables, global variables and static variables)		CLO-03
12	Call by value,		
	Call by reference		
13	Arrays Declaration, Initialization,	Assignment	
13	Accessing and processing one-Dimensional Arrays	#03	CLO-03
	Examples of array.		
14	Stack Implementation.		CLO-03
	Passing arrays to functions,		
1.5	Two dimensional Arrays, Strings	0 : "02	CI O O2
15	Fundamentals of character arrays, array of strings, string	Quiz #03	CLO-03
	manipulation functions  Structures		
16	Declaring Structures and their variables,		CLO-03
10	Accessing structure members,		CLO-03
	Pointers		
1-	Fundamentals of pointers		GI C 05
17	Pointer expressions and arithmetic Pointers and Arrays		CLO-03
	Pointers and Functions		
18			
10	Final Semester Examination		

# **Course outlines Theory work:**

# 1. Algorithms

- a. Definition
- b. Properties
- 2. Flow charts
- a. Types
- b. Advantages and disadvantages

#### 3. Pseudo code

- a. Rules
- b. Designing Algorithm with Pseudo code
- c. Advantages and disadvantages of Pseudo code

#### 5. Operators

- a. Assignment operators
- b. Arithmetic operators
- c. Conditional Operators
- d. Relational operators
- e. Logical Operators
- f. Basic Program constructions

#### 6. Control statements

- a. Conditional statements
- b. Iteration statements
- c. Jump statements

## 7. Arrays

- a. Array accessing and declaration
- b. One and multi-dimensional arrays
- c. Passing values to the Array, with reference and value
- d. Character arrays

#### 8. Functions

- a. Declaration, calling and definition
- b. Passing values to function

## 9. Library Functions

- a. System Defined functions
- b. Trigonometric functions
- c. Arithmetic functions
- d. String functions
- e. Conversion functions

#### 10. Structures

- a. Declaring Structures and their variables,
- b. Accessing structure members,

#### 11. Pointers

- a. Data type renaming
- b. Declaring pointers
- c. Calling a function by reference

## **Teaching & Learning Activities (TLAs):**

Course learning outcomes will be achieved through a combination of the following teaching strategies.

- PowerPoint presentations
- Use of internet & email
- Assignments and Quizzes
- Mid-term major examination
- Presentations

## • Final examination

# Assessment Tasks, Activities and CLO mapping:

Course learning outcomes will be achieved by using the following assessment tasks and activities.

Mid-term major examination = 30 % Final comprehensive examination = 70 %

Assessment Tasks & Activities	CLO1	CLO2	CLO3
Mid-term major examination	X	X	X
Final comprehensive examination	X	X	X
Quizzes and homework assignments	X	X	X

# Mapping of CLOs with GAs

CLOs	CLO1	CLO2	CLO3
GAs			
GA 01			
(Academic Education)			
GA 2			
(Knowledge for Solving Computing Problems)	X	X	
GA 3			
(Problem Analysis)			
GA 4			X
(Design/ Development of Solutions)			Λ
GA 5			
(Modern Tool Usage)			
GA 6			
(Individual and Team Work)			
GA 7			

(Communication)		
GA 8		
(Computing Professionalism and Society)		
GA 9		
(Ethics)		
GA 10		
(Life-long Learning)		