## COMPUTER PROGRAMMING

**UNIT CODE: IT/CU/ICT/CR/10/6**

**Relationship to Occupational Standards**

This unit addresses the competency: **Develop computer program**

**Duration of Unit: 300** hours

**Unit Description:**

This unit specifies competencies required to develop computer program. It involves Identifying program and programming concepts, identifying phases of program development, perform program design and Analysis, develop a Computer program, Perform Program testing and debugging, Perform User training and Program Maintenance.

**Summary of Learning Outcomes:**

1. Identify program and programming concepts
2. Identify Phases of Program development
3. Perform program design and Analysis
4. Develop a Computer program
5. Perform Program testing and debugging
6. Perform User training and Program Maintenance

**Learning Outcomes, Content and Suggested Assessment Methods**

|  |  |  |
| --- | --- | --- |
| **Learning Outcome** | **Content** | **Suggested Assessment Methods** |
| 1. Identify program and programming concepts | * Definition of program and programming * Programming concepts * Program structure * Variable declaration * Looping structures * Control structures * Syntax * Programming languages * Object oriented * Functional * Imperative * Declarative * Approaches of program development * Waterfall * Agile * Spiral etc | * Practical exercises with observation checklist * Oral questioning * Written test * Learner portfolio of evidence. |
| 1. Identify Phases of Program development | * Phases of program development * Planning * System analysis and design * System development * Testing * Implementation | * Practical * Project * Observation * Written test |
| 1. Perform program design and Analysis | * Definition of program design and analysis * Program design and analysis tools * Dataflow diagram * Pseudocode * HIPO Diagram * Structure charts * Software design levels * High level design * Detailed design * Architectural design * Types of system design * Form design * File organization design * Database design | * Practical exercises * Oral questioning * Written test |
| 1. Develop a Computer program | * Format of a computer program * Source code * Components of the program: Program header, declarations, main body * Interrelationships between components * Data structures * Fundamentals of structured programming using C language * Special features * Structure of C language * Variables and constants * Input/output functions * Literal reserved words * Identifiers * Data types and their sizes * Conditional statements * Loop control * C functions * Library functions * User defined functions * Arguments and parameters * Fundamentals of Object Oriented programming using Java * Object oriented programming * Java language * Java Virtual Machine * Java Libraries * Program structure * Java Output * Variables and expressions * Classes and objects * Input in java * Data types and operators * Boolean statements * Loops and program flow * Arrays * Exception handling | * Practical exercises * Oral questioning * Learner portfolio of evidence. |
| 1. Perform Program testing and debugging | * Difference between testing and debugging. * Types of testing * Smoke * Functional * Usability * Security * Performance * Regression * Compliance * Levels of testing * Unit * Integration * System * Acceptance * Methods of testing * Black box * White box * Gray box * Agile * Adhoc * Debugging steps * Debugging requirements * Debugging principles * Debugging techniques | * Practical exercises * Oral questioning * Written test * Learner portfolio of evidence. |
| 1. Perform User training and Program Maintenance | * Identification of user training needs * Methods of user training * User training manuals * Maintenance schedule * System maintenance tools and techniques. * Monitoring of system performance * Rectification of bugs * Handling requested changes |  |

**Suggested Methods of Delivery**

* Presentations and practical demonstrations by trainer;
* Guided learner activities and research to develop underpinning knowledge;
* Supervised activities and projects in a workshop;

The delivery may also be supplemented and enhanced by the following, if the opportunity allows:

* Visiting lecturer/trainer from the ICT sector;
* Industrial visits.

**Recommended Resources**

|  |
| --- |
| **Tools**  Comprehensive set of tools.   * Flow charts * Data flow diagram * Decision table * Data dictionary * Decision tree |
| **Equipment**   * Computer * Software |
| **Materials and supplies**  Digital instructional material including DVDs and CDs |