FUNDAMENTALS OF PROGRAMMING

UNIT CODE: ICT/CU/CS/CR/04/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Understand Fundamentals of Programming

Duration of Unit: 180 hours

Unit Description:

This unit covers the competencies required to understand fundamentals of programming. It involves understanding programming concepts, understanding the Java environment, performing data operations, using control structures, using methods and understanding Object Oriented programming.

Summary of Learning Outcomes:

1. Understand Programming Concepts
2. Understand the Java environment
3. Perform Data Operations
4. Use Control Structures
5. Use Methods
6. Understand Object Oriented Programming

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Understand Programming Concepts	• Definition of programming • Phases of program development ✓ Establish program requirements ✓ Design a program ✓ Coding ✓ Code test and debug ✓ Document ✓ Maintain • Key terms used in programming ✓ Algorithm ✓ Source code ✓ Executable ✓ Compiling	• Practical tests • Oral tests • Written tests

	✓ Debugging • Types of code ✓ Source code ✓ Object code ✓ Machine code • Translators used in programming ✓ Compiler ✓ Interpreter ✓ Assembler • OOP fundamental concepts	
2. Understand the Java Environment	• Installation of Java ✓ Download Java for Windows ✓ Install JDK ✓ Set the Environment variables • Java Programming environment ✓ Downloading Eclipse IDE ✓ Setting up Eclipse IDE ✓ Launching Eclipse IDE • Features of Java • Java syntax ✓ Case Sensitivity ✓ Class names ✓ Method names ✓ Program file name ✓ Public static void main ✓ Identifiers ✓ Modifiers ✓ Variables ✓ Java Arrays ✓ Java Enums ✓ Java Keywords	• Practical tests • Oral tests • Written tests
3. Perform Data Operations	• Java Data Types ✓ Integer ✓ Float ✓ Strings ✓ Boolean	• Practical tests • Oral tests • Written tests

	• Java statements ✓ Expression Statements ✓ Declaration Statements ✓ Control-flow statements • Variables and Constants ✓ Local Variables ✓ Class Variables ✓ Instance Variables ✓ Integer constants ✓ Real Constants ✓ Single character constants ✓ String constants • Java Data operations ✓ Variable assignment ✓ Variable reading ✓ Variable arithmetic ✓ Object Instantiation • Java Program to perform an operation ✓ Area of a circle ✓ Solve Quadratic equations ✓ Calculate compound interest	
4. Use Control structure	• Java Control Statements ✓ Decision making statements ✓ Looping statements ✓ Branching statements • Uses of different control statements in Java Decision making statements ✓ If then ✓ If then else ✓ Switch Looping statements ✓ for ✓ while ✓ do while	• Practical tests • Oral tests • Written tests

	Branching statements ✓ break ✓ Continue • Creation of programs using control statements	
5. Use Methods	• Java Methods ✓ Definition ✓ Structure • Demonstration of methods ✓ Creating Methods ✓ Method calling ✓ Void keyword ✓ Passing parameters by value ✓ Method overloading ✓ Using command line arguments ✓ The this keyword ✓ Variable arguments ✓ The finalize () method • Creation programs to implement methods	• Practical tests • Oral tests • Written tests
6. Understand Object Oriented Programming	• Object oriented programming concepts ✓ Inheritance ✓ Encapsulation ✓ Abstraction ✓ Polymorphism • Classes ✓ Declaring attributes ✓ Creating Methods • Objects ✓ Creating objects ✓ Calling methods • Creation of programs to implement inheritance	• Practical tests • Oral tests • Written tests

Suggested Methods of Instruction

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;

- Supervised practical assignments and projects;
- Visiting lecturer/expert from the ICT sector;
- Industrial visits.

Recommended Resources

Tools

- JDK

Equipment

- Computers

Materials and supplies

- Instructional materials
- Stationery

Reference materials

- Trainer-recommended resources including web resources