

## [ICDL-CPT] ICDL Computing

Length	: 16 (hours) / 2 (days)
Audience(s)	: Anyone interested in developing generic problem-solving skills, understanding fundamental concepts of basic computing and coding knowledge
Delivery Method	: Instructor-led (Classroom) with hands-on exercises on computers
Technology	: Python IDLE programming environment

### Course Overview

This module sets out the skills and competences relating to computational thinking and coding and will guide you through the process of problem solving and creating simple computer programs. This module will help you understand how to use computational thinking techniques to identify, analyse and solve problems, as well as how to design, write and test simple computer programs using well structured, efficient and accurate code.

### Course Objectives

- Understand key concepts relating to computing and the typical activities involved in creating a program.
- Understand and use computational thinking techniques like problem decomposition, pattern recognition, abstraction and algorithms to analyse a problem and develop solutions.
- Write, test and modify algorithms for a program using flowcharts and pseudocode.
- Understand key principles and terms associated with coding and the importance of well-structured and documented code.
- Understand and use programming constructs like variables, data types, and logic in a program.
- Improve efficiency and functionality by using iteration, conditional statements, procedures and functions, as well as events and commands in a program.
- Test and debug a program and ensure it meets requirements before release.

### Pre-Requisites

- Proficient in using a Microsoft Windows computer and software
- Speak, write and understand English

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## Course Outline

### **LESSON 1 - THINKING LIKE A PROGRAMMER**

- 1.1 Computational Thinking
- 1.2 Instructing a Computer

### **LESSON 2 - SOFTWARE DEVELOPMENT**

- 2.1 Precision of Language
- 2.2 Computer Languages
- 2.3 Text About Code
- 2.4 Stages in Developing a Program

### **LESSON 3 - ALGORITHMS**

- 3.1 Steps in an Algorithm
- 3.2 Methods to Represent a Problem
- 3.3 Flowcharts
- 3.4 Pseudocode
- 3.5 Fixing Algorithms

### **LESSON 4 - GETTING STARTED**

- 4.1 Introducing Python
- 4.2 Exploring Python
- 4.3 Saving a Program

### **LESSON 5 - PERFORMING CALCULATIONS**

- 5.1 Performing Calculations with Python
- 5.2 Precedence of Operators

### **LESSON 6 - DATA TYPES AND VARIABLES**

- 6.1 Data Types
- 6.2 Variables
- 6.3 Beyond Numbers

### **LESSON 7 - TRUE OR FALSE**

- 7.1 Boolean Expressions
- 7.2 Comparison Operators
- 7.3 Boolean Operators
- 7.4 Booleans and Variables
- 7.5 Putting It All Together

### **LESSON 8 - AGGREGATE DATA TYPES**

- 8.1 Aggregate Data Types in Python
- 8.2 Lists
- 8.3 Tuples

### **LESSON 9 - ENHANCE YOUR CODE**

- 9.1 Readable Code
- 9.2 Comments
- 9.3 Organisation of Code
- 9.4 Descriptive Names

### **LESSON 10 - CONDITIONAL STATEMENTS**

- 10.1 Sequence and Statements
- 10.2 IF Statement
- 10.3 IF...ELSE Statement

### **LESSON 11 - PROCEDURES AND FUNCTIONS**

- 11.1 Subroutines
- 11.2 Functions and Procedures

### **LESSON 12 - LOOPS**

- 12.1 Looping
- 12.2 Looping with Variables
- 12.3 Variations on Loops
- 12.4 Putting It All Together

### **LESSON 13 - LIBRARIES**

- 13.1 Using Libraries
- 13.2 Standard Libraries
- 13.3 Events
- 13.4 Pygame Library
- 13.5 Boilerplate Code
- 13.6 Drawing Using the Libraries

### **LESSON 14 - RECURSION**

- 14.1 Recursion
- 14.2 Recursive Drawing

### **LESSON 15 - TESTING AND MODIFICATION**

- 15.1 Types of Errors
- 15.2 Finding Errors
- 15.3 Testing and Debugging a Program
- 15.4 Improving a Program

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