Programming Foundations Training

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Duration: **3 Day**

Overview

This foundational training provides non-programmers, system administrators, and aspiring developers with a solid understanding of how computer systems work from a **programmer's perspective**.

Participants learn **core programming principles**, **data structures**, and **coding best practices** using Python for exercises.
The course is **language-neutral**, preparing learners to transition into other languages such as Java, C#, or C++.

Regulatory Note (BDDK)

While not a regulatory course on its own,**Programming Foundations** supports the **Banking Regulation and Supervision Agency (BDDK)** mandates — particularly **Article 20 (Secure Software Development)** and **Article 25 (Information Security Management)** — by instilling fundamental awareness of coding quality and secure development habits.

It is **recommended for financial institutions** as an introductory step toward secure software development compliance programs.

Who Should Attend

System administrators, support staff, trainee developers, and IT professionals looking to understand programming principles and collaborate effectively with developers.

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What You Will Learn

By the end of this training, you will have gained knowledge and skills in the following areas:

- Understand computer and OS components.
- Work with data types, variables, and memory structures.
- Use operators and logical expressions effectively.
- Manage control flow, loops, and exceptions.
- Build modular programs with functions and libraries.
- Handle files and I/O operations safely.
- Write clean, readable, and maintainable code.

After completing this course, participants will:

- Have a clear understanding of software structure and execution,
- Be prepared to learn advanced languages like Java or C#,
- Possess the **foundational knowledge required for BDDK-compliant secure coding practices**.

Outline

Chapter 1: System Components

- Computer system components
- Central hardware components
- Moore's Law
- Software components
- Operating systems
- Processes
- Virtual memory
- Virtualisation
- Cloud Computing

Chapter 2: First Steps

- What is a program?
- What does a programmer do?
- Components of a program
- Programming languages
- Standards

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- Applications and libraries
- Code used by more than one program
- What does a program do?
- Paper to program
- Creating a program
- A first program
- Running a program
- Error messages are your friends
- Giving names to data items
- Assignment statements
- Console vs. GUI
- Simple graphical messages
- Special characters

Chapter 3: Data

- Representing data
- Common numbering systems
- Numbers in programming languages
- Bits, bytes and words
- Conventions
- Fundamental types
- Getting it wrong
- Representing characters
- The problem with the Euro
- Representing integers
- Representing floating point
- E numbers
- Representing time
- Representing nothing

Chapter 4: Variables and Operators

- Variables and constants
- Objects
- Life of a variable - scope
- An alternative to scope
- Namespaces
- Choosing variable names
- Names you should not use
- Operations on data
- Choosing variable types
- Assignment and types
- Simple operations?
- Operator precedence
- Comments

Chapter 5: Containers

- Arrays and lists
- Sorting
- Other linear types - stacks, queues, deques
- Downside of linear structures

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- Non-linear types and keys
- Containers for records - tree structures
- Associative arrays
- Compound types
- Class
- Object Orientation

Chapter 6: Flow Control

- Flow control
- Altering program flow
- Simple decision statements
- What is truth?
- Boolean operators
- Logical operators
- Using logical operators
- Loops
- Simple loop statements
- Array processing
- Language supplied iterators
- Interrupt handling
- Exception handling

Chapter 7: Program Structure

- Scope revisited
- Named blocks
- Calling a function
- Arguments and Parameters
- Passing arguments by copy
- Passing arguments by reference
- Returning results
- Function call syntax
- Recursion
- Entry points
- Modules and Libraries
- Why hide code and data? Encapsulation
- Asynchronous subroutines - Threads

Chapter 8: Input and Output

- What is a file?
- File systems
- Exchangeable file systems
- I/O Libraries and Layers
- File data types
- File names
- Opening a file
- Opening a file - checks
- Opening a file - modes
- Sequential access
- Random access
- Buffering

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- Concurrency issues
- Locking strategies

Chapter 9: Building Programs

- Compilation
- Linking
- Loading and running
- Process attribute inheritance
- Portability
- Emulators
- Interpretation
- The third way: Byte-code
- Optimisation
- Debuggers

Chapter 10: Coding Style

- Virtues of a programmer
- Readability and style
- Naming conventions
- Error handling
- Programming for change
- The need for speed
- Programming for performance
- Constants - aren't
- Portability and flexibility
- Help!