



# Python Fundamentals

## Module 1: Python Basics

Build a strong foundation by understanding computer fundamentals, Python architecture, execution flow, and programming basics.

### Topics Covered:

- Computer Fundamentals (I/O Devices, CPU & Memory)
- Computer Organization & Operating Systems
- Why Programming Languages?
- Introduction to Python
- Python Standards & Implementations
- How Python Programs are Executed
- Python Programming Terminology
- Python Installation & Environment Setup
- Writing Your First Python Program
- Comments in Python

## Module 2: Variables & Data Types

Learn how Python manages data using variables, built-in data types, and type conversion techniques.

### Topics Covered:

- Variables in Python
- Variable Assignment & Swapping
- id() Function
- type() Function
- Tuples



- Type Conversion
- Python Data Model Fundamentals

## Module 3: Input & Output

Master user interaction and formatted output in Python applications.

### Topics Covered:

- print() Function
- input() Function
- Formatting Console Output

## Module 4: Operators

Understand Python operators and solve numerical programming problems.

### Topics Covered:

- Arithmetic Operators
- Logical Operators
- Identity Operators
- Membership Operators
- Bitwise Operators
- Last Digit of a Number
- Days Before N Days
- Arithmetic Progression
- Geometric Progression

## Module 5: Decision Making & Flow Control



Develop logical thinking using Python's conditional statements.

### **Topics Covered:**

- if, elif & else
- Even & Odd Numbers
- Largest of Three Numbers
- Leap Year
- Calculator Program

## **Module 6: Loops & Pattern Programming**

Master iterative programming and solve algorithmic problems using loops.

### **Topics Covered:**

- while Loop
- for Loop
- range() Function
- break & continue
- Nested Loops
- Number Tables
- Square, Triangle & Inverted Triangle Patterns
- Fibonacci Series
- GCD & LCM
- Practice Problems

## **Module 7: Functions**



Learn modular programming using functions and understand Python's flexible parameter passing mechanisms.

### **Topics Covered:**

- Functions in Python
- Applications of Functions
- Function Execution Flow
- Default Arguments
- Keyword Arguments
- Variable-Length Arguments
- Returning Multiple Values
- Parameter Passing
- Global Variables
- Number-based Programming Problems

## **Module 8: Lists & Sequence Operations**

Work efficiently with Python's most commonly used collection type.

### **Topics Covered:**

- Introduction to Lists
- Internal Working of Lists
- List, Tuple & String Slicing
- Average (Mean) of a List
- Sorted List Validation
- Filtering Smaller Elements
- Separating Even & Odd Numbers
- List Comprehensions

## **Module 9: Strings**



Master string manipulation and text processing techniques in Python.

### **Topics Covered:**

- String Fundamentals
- Escape Sequences
- Raw Strings
- Formatted Strings (f-Strings)
- String Operations
- String Comparison
- Pattern Searching
- Reverse a String
- Palindrome Check
- Decimal ↔ Binary Conversion
- String-based Programming Problems

## **Module 10: Python Built-in & Functional Programming Features**

Leverage Python's powerful built-in functions and modern programming capabilities.

### **Topics Covered:**

- Lambda Functions
- zip()
- map()
- filter()
- Magic (Special) Methods
- Operator Overloading Basics
- Python Style Guide (PEP 8)



## Module 11: Exception Handling

Build reliable and fault-tolerant Python applications through structured exception handling.

### Topics Covered:

- Understanding Errors
- Exception Types
- Handling Exceptions
- Best Practices for Exception Handling

## Object-Oriented Programming with Python

Develop scalable and maintainable applications using object-oriented programming principles.

## Module 12: Fundamentals of OOP

- Introduction to Object-Oriented Programming
- Classes & Objects
- Class and Instance Attributes

## Module 13: Encapsulation

- Data Encapsulation
- Accessing Class Members
- Data Protection Techniques



## Module 14: Abstraction

- Abstraction Concepts
- Abstract Classes

## Module 15: Inheritance

- Inheritance in Python
- Types of Inheritance
- Multiple Inheritance

## Module 16: Polymorphism

- Polymorphism
- Method Overriding
- Operator Overloading
- Real-world Examples of Polymorphism