

Python Programming

Professional Course Duration: 5
Months (100–120 Hours)

Course Objective

This course is designed to help students build a strong foundation in Python programming and prepare them for careers in software development, automation, data analysis, AI, and backend development. The curriculum is project-oriented with hands-on coding practice.

Module 1: Programming Fundamentals

Topics Covered

- Introduction to Programming
- Algorithms & Flowcharts
- Programming Logic
- Variables & Data Types
- Operators
- Input & Output
- Comments

Practical

- Calculator Program
- Temperature Converter
- Basic Logic Programs

Module 2: Python Fundamentals

Topics Covered

- Introduction to Python
- Installing Python & VS Code
- Python Syntax
- Keywords & Identifiers
- Variables
- Data Types
- Operators

- User Input
- Comments
- Indentation

Practical

- Student Information Program
- Simple Billing Program
- Unit Converter

Module 3: Control Statements

Topics Covered

- if Statement
- if-else
- Nested if
- elif
- Match Case
- for Loop
- while Loop
- Break
- Continue
- Pass

Practical

- Number Guessing Game
- ATM Simulation
- Menu-Driven Programs

Module 4: Functions & Modules

Topics Covered

- Function Definition
- Parameters & Arguments
- Return Values
- Lambda Functions
- Recursion
- Built-in Modules
- Import Statements
- User-Defined Modules

Modules Covered

- math
- random
- datetime

- calendar
- os
- sys

Practical

- Calculator Module
- Password Generator
- Date & Time Utilities

Module 5: Data Structures

Topics Covered

- Strings
- Lists
- Tuples
- Sets
- Dictionaries
- List Comprehension
- Nested Collections

Practical

- Student Record System
- Contact Book
- Inventory Management

Module 6: Object-Oriented

Programming (OOP)

Topics Covered

- Classes & Objects
- Constructors
- Instance & Class Variables
- Methods
- Encapsulation
- Inheritance
- Polymorphism
- Abstraction

Practical

- Bank Management System
- Library Management System
- Employee Management System

Module 7: File Handling & Exception Handling

File Handling

- Read Files
- Write Files
- Append Files
- CSV Files
- JSON Files

Exception Handling

- try
- except
- else
- finally

Practical

- Student Result File
- Expense Tracker
- Log File Management

Module 8: Database Connectivity

Topics Covered

- Database Basics
- SQLite
- MySQL Connectivity
- CRUD Operations
- SQL Queries
- Parameterized Queries

Practical

- Student Database
- Employee Database
- Login System

Module 9: Python for Automation

Topics Covered

- OS Automation
- File Automation
- Folder Management
- Email Automation
- PDF Handling
- Excel Automation
- Web Scraping Basics

Libraries Covered

- os
- shutil
- smtplib
- openpyxl
- pandas
- requests

Practical

- Automatic Report Generator
- Bulk File Renaming
- Excel Report Automation

Module 10: Data Analysis with Python

Topics Covered

- Introduction to Data Analysis
- NumPy
- Pandas
- Data Cleaning
- Data Filtering
- Data Visualization

Libraries Covered

- NumPy
- Pandas
- Matplotlib

Practical

- Sales Analysis
- Student Performance Analysis
- Business Reports

Module 11: Introduction to AI & Machine Learning

Topics Covered

- What is AI?
- Machine Learning Basics
- Types of Machine Learning
- Data Preparation
- Model Training

- Prediction Concepts

Libraries Covered

- Scikit-learn

Practical

- Student Marks Prediction
- House Price Prediction (Basic)
- Iris Classification Project

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Module 12: GUI Development

Topics Covered

- Tkinter Basics
- Labels
- Buttons
- Entry Boxes
- Frames
- Menus
- Message Boxes

Practical

- Calculator
- Login Form
- Student Registration Form

Module 13: APIs & JSON

Topics Covered

- API Basics
- REST APIs
- JSON Data
- HTTP Requests
- API Authentication

Practical

- Weather API
- Currency Converter
- News Fetcher

Module 14: Git & GitHub

Topics Covered

- Version Control
- Git Installation
- Repository Management

Python Programming

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- GitHub Basics
- Branching & Collaboration

Practical

- Push Projects to GitHub
- Team Collaboration

- Programming Logic
- Problem Solving
- Debugging Techniques
- Code Optimization
- Documentation
- Coding Best Practices
- AI Productivity Tools
(ChatGPT for Developers)

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Module 15: Project Development

Mini Projects

- Calculator
- ATM System
- Student Management System
- Contact Book
- Quiz Application

Major Projects (Choose Any One)

- Library Management System
- Inventory Management System
- Billing Software
- Attendance Management System
- Student Result Management
- File Organizer Automation Tool

Learning Outcomes

After completing this course, students will be able to:

- ✓ Write efficient Python programs from scratch
- ✓ Build console and GUI applications
- ✓ Work with files, databases, and APIs
- ✓ Automate repetitive tasks using Python
- ✓ Analyze and visualize data with Pandas and NumPy
- ✓ Understand the fundamentals of Artificial Intelligence and Machine Learning
- ✓ Develop real-world projects for a professional portfolio

Software & Tools Covered

- Python 3.x
- Visual Studio Code
- Jupyter Notebook
- SQLite
- MySQL
- GitHub
- NumPy
- Pandas
- Matplotlib
- Scikit-learn
- Tkinter
- Requests

Career Opportunities

- Python Developer
- Junior Software Developer
- Automation Engineer
- Data Analyst (Entry Level)
- Backend Developer (Junior)
- AI/ML Trainee
- QA Automation Trainee
- Technical Support Engineer
- Freelance Python Developer

Additional Skills