

Certificate Course in Python Programming (Basic to Advanced)

Offered by Centre for Innovative Skill-Based Courses (CISBC)
Open Learning Development Centre (OLDC), University of Delhi

Duration: 6 Months

Mode: Offline (Classroom Training)

Eligibility: 12th Pass (Any Stream)

Course Overview

This extended 6-month course provides in-depth knowledge of Python programming from basic to advanced levels. It emphasizes **hands-on practice, real-world applications, data analysis, and project-based learning**, enabling learners to build strong programming foundations and industry-ready skills.

Course Objectives

- Introduce fundamental concepts of Python programming
 - Develop problem-solving skills using Python
 - Understand data structures and object-oriented programming
 - Enable handling of files, databases, and external data formats
 - Provide knowledge of libraries like NumPy and Pandas
 - Develop skills in data analysis and visualization
 - Introduce advanced concepts like decorators, generators, and APIs
 - Apply Python knowledge to real-world projects
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Course Content (Module-Wise)

Module 1: Introduction to Python

- Overview of Python and its applications
 - Installation and setup of Python environment
 - Basic syntax and operations
 - Data types and variables
 - Input and output operations
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Module 2: Data Structures & Basics

- Identifiers and keywords
 - Built-in data types
 - Lists, Tuples, Dictionaries, Sets
 - Mutable and immutable objects
 - Comprehensions in Python
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Module 3: Control Structures & Functions

- Conditional statements
 - Loops
 - Break and continue
 - Functions and lambda functions
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Module 4: Object-Oriented Programming

- Classes and objects
 - Inheritance and polymorphism
 - Encapsulation and abstraction
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Module 5: Advanced OOP & Exception Handling

- Magic methods
 - Static and class methods
 - Exception handling and custom exceptions
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Module 6: File Handling

- Reading and writing files
 - CSV and JSON handling
 - Exception handling in files
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Module 7: Modules & Libraries

- Importing modules
 - Creating packages
 - Random module functions
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Module 8: NumPy

- Arrays and computations
 - Data organization
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Module 9: Visualization

- Turtle graphics
 - Matplotlib plotting
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Module 10: Pandas

- DataFrames and Series
 - Data cleaning and manipulation
 - Grouping and statistics
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Module 11: Pandas I/O & SQL

- Reading/writing data
 - Basic SQL (SELECT, WHERE)
 - read_sql and to_sql
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Module 12: Advanced Topics

- Generators and decorators
 - APIs and JSON handling
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Module 13: Practice & Problem Solving

- Practice on coding problems
 - Logic building exercises
 - Mini coding assignments
 - Debugging and optimization techniques
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Module 14: Real-World Applications

- Data analysis case studies
 - Working with real datasets
 - Automation tasks using Python
 - Introduction to basic scripting
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Module 15: Capstone Project Development

- Project planning and idea selection
 - Implementation using Python, Pandas, NumPy, SQL
 - Data analysis and visualization
 - Report preparation and presentation
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Module 16: Revision & Final Evaluation

- Complete syllabus revision
 - Mock tests and practice
 - Final project submission
 - Viva / Practical evaluation
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Project Work

- Industry-oriented project using data analysis, Pandas, NumPy, APIs, and/or SQL
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Learning Outcomes

- Apply Python programming fundamentals
 - Use data structures effectively
 - Develop OOP-based programs
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- Handle files and data operations
 - Analyse and visualize data
 - Work with databases using SQL
 - Apply advanced Python concepts
 - Build real-world projects
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Course Delivery

- Classroom-based offline sessions
 - Hands-on coding practice
 - Weekly assignments and exercises
 - Project-based learning
 - Doubt clearing and mentoring sessions
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Assessment

- Weekly assignments and quizzes
 - Practical coding tests
 - Mini project evaluation
 - Final project submission and viva
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Career Opportunities

- Python Developer
- Data Analyst
- Software Developer
- Backend Developer
- Automation Engineer