

Comprehensive Python

Module 1: Introduction to Python

- Overview of Python & Its Applications
 - Installing Python & Setting Up Environment (Anaconda, VS Code, PyCharm)
 - Writing & Executing Python Scripts
 - Understanding Python's Interactive Mode (REPL)
 - Basic Syntax & Code Structure
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Module 2: Python Basics & Data Types

- Variables & Constants in Python
 - Primitive Data Types:
 - Integer, Float, String, Boolean
 - Type Conversion & Type Casting
 - Operators in Python:
 - Arithmetic, Comparison, Logical, Bitwise, Assignment, Identity & Membership Operators
 - Taking User Input & Printing Output
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Module 3: Control Flow Statements

- Conditional Statements:
 - if, if-else, nested if-else
 - Looping Statements:
 - for loop, while loop
 - Loop Control Statements: break, continue, pass
 - List Comprehensions & Generator Expressions
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Module 4: Data Structures in Python

- **Lists:** Creating, Indexing, Slicing, Methods & Operations
 - **Tuples:** Immutable Sequences, Packing & Unpacking
 - **Dictionaries:** Key-Value Pairs, Methods & Operations
 - **Sets:** Unique Elements, Set Operations & Methods
 - **String Handling:** String Operations, Formatting & Methods
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Module 5: Functions in Python

- Defining & Calling Functions
 - Function Arguments & Return Values
 - Default, Keyword & Variable-length Arguments
 - Recursive Functions
 - Lambda Functions (Anonymous Functions)
 - Python Built-in Functions
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Module 6: File Handling

- Reading & Writing Files
 - File Modes: read, write, append
 - Working with Text & Binary Files
 - Exception Handling in File Operations
 - Using with Statement for File Handling
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Module 7: Exception Handling

- Introduction to Exceptions
 - Handling Exceptions using try, except, finally
 - Built-in Exceptions & Custom Exceptions
 - Raising Exceptions (raise Statement)
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Module 8: Object-Oriented Programming (OOP) in Python

- Understanding Classes & Objects
 - Constructor & Destructor (`__init__` method)
 - Instance & Class Variables
 - Methods: Instance Methods, Class Methods & Static Methods
 - Inheritance: Single, Multiple & Multilevel Inheritance
 - Method Overriding & Operator Overloading
 - Encapsulation & Abstraction
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Module 9: Modules & Packages

- Creating & Importing Modules
 - Standard Python Modules (math, random, datetime, etc.)
 - Understanding Python Package Structure
 - Installing & Using Third-party Packages with pip
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Module 10: Working with Regular Expressions

- Introduction to Regular Expressions (Regex)
 - Using Python's re Module
 - Pattern Matching & Searching (match(), search(), findall())
 - Working with Meta Characters & Special Sequences
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Module 11: Working with Date & Time

- Python's datetime Module
 - Formatting & Parsing Dates
 - Performing Date Arithmetic
 - Working with time Module
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Module 12: Python and Databases (SQLite & MySQL)

- Introduction to Databases & SQL
 - Connecting Python with SQLite & MySQL
 - CRUD Operations (Create, Read, Update, Delete)
 - Executing Queries & Fetching Results
 - Using sqlite3 & mysql-connector Modules
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Module 13: Multithreading & Concurrency

- Introduction to Multithreading
 - Python's threading Module
 - Creating & Managing Threads
 - Synchronization & Thread Safety
 - Understanding Python's Global Interpreter Lock (GIL)
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Module 14: Web Scraping with Python

- Introduction to Web Scraping
 - Fetching Web Pages using requests
 - Parsing HTML using BeautifulSoup
 - Handling Dynamic Content with Selenium
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Module 15: Working with APIs

- Understanding APIs & RESTful APIs
 - Making API Requests using requests Module
 - Handling JSON Data in Python
 - Working with Public APIs (OpenWeather, GitHub API, etc.)
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Module 16: Data Analysis with Python (Basics)

- Introduction to NumPy for Numerical Computing
 - Using Pandas for Data Handling
 - Data Cleaning & Manipulation
 - Basic Data Visualization with Matplotlib & Seaborn
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Module 17: Introduction to Python for Automation

- Automating File & Folder Operations
 - Working with Excel & CSV Files using openpyxl & pandas
 - Automating Emails with smtplib
 - Automating Browser Tasks using Selenium
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Module 18: Introduction to Machine Learning with Python

- Basics of Machine Learning
 - Using Scikit-Learn for ML Models
 - Building a Simple ML Model in Python
 - Introduction to AI & Deep Learning
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Module 19: Testing & Debugging in Python

- Debugging Techniques
 - Using pdb (Python Debugger)
 - Writing Unit Tests with unittest
 - Logging & Handling Errors
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Module 20: Advanced Python Concepts

- Decorators & Generators
- Context Managers & with Statement
- Memory Management & Garbage Collection
- Python Performance Optimization

Module 21: Python Project (Hands-On)

- Real-World Project using Python
- End-to-End Development & Deployment
- Best Practices & Code Optimization