

KOENIG SOLUTIONS · COURSE OUTLINE

Mastering Python (Comprehensive Programming)

Learn to program in Python, from core syntax and data structures to OOP, databases, GUIs, Django, and data analysis.

25

MODULES

156

TOPICS

COURSE OVERVIEW

This course introduces Python installation and both interactive and scripting modes, before covering variables, flow control, loops, lists, tuples and dictionaries. It then addresses functions, modules, operating system services, file handling, exceptions, XML and JSON data, object-oriented programming, metaprogramming, database access, network programming and multiprocessing with threads and processes. Later modules build graphical applications with Tkinter and web applications with the Django framework, including templates, forms and models. The final modules apply Python to data analysis and visualisation using NumPy, Pandas and Matplotlib, alongside foundational machine learning concepts.

WHO THIS COURSE IS FOR

Python Developers

Software Developers

Web Developers

Data Analysts

Backend Developers

LEARNING OBJECTIVES

- Explain Python installation and interactive versus scripting modes
- Apply flow control using if, elif, else, while and for statements
- Manipulate lists, tuples and dictionaries using built-in methods
- Define functions with parameters, return values and variable scope
- Implement file input and output along with exception handling
- Build object-oriented programs using classes and inheritance
- Develop GUI apps with Tkinter and web apps with Django
- Analyse and visualise data using NumPy, Pandas and Matplotlib

25 Modules, 156 Topics

01

Getting Started with Python

TOPICS

- Introduction Python
- Installing Python on Windows
- Installing Python on Linux and Other Operating Systems
- Introduction Python IDLE
- Programming in Interactive Mode
- Programming in Scripting Mode

02

Types, Variables and Input / Output

TOPICS

- Using quotes and escape character
- String Concatenation and Repeater Operators
- Using Mathematical Operators with Numbers
- Understanding Variables
- Getting User Input with input()
- Using Strings Methods
- Converting Values

03

Flow Control in Python

TOPICS

The if Statement · The else Clause · Using elif Clause · The while Statement · Avoiding infinite loops · Values as conditions · Using Logical Operators · Planning Your Program with Pseudocode

04

For & While Loops

TOPICS

How to use While · How to use While..else · Using For · Iteration

05

Lists in Python

TOPICS

- Creating and Using Lists
- Len() with Lists
- In Operator with Lists
- Indexing, Slicing and Concatenating
- Deleting List Element with del
- Using Lists Methods such as append(), sort(), reverse(), count(), pop(), remove(), insert() and index()
- Using Nested Sequences
- Understanding Shared References

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Tuple

TOPICS

Using Tuples · Sequence Operators with Tuple · Functions with Tuples

07

Dictionaries

TOPICS

- Using Dictionaries
- Accessing Dictionary values
- Adding, Replacing and Deleting key-value pairs
- **Functions:** get(), keys(), values() and items()

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Functions in Python

TOPICS

Defining Functions · Using Parameters and Return Values · Using Arguments and Defaults Parameters · Using Global Variables and Constants · Variable Scope · References

09

Modules

TOPICS

Using Modules in Programs · Writing Modules · Importing Modules · Using Imported Functions and Modules

10

OS Services

TOPICS

The os module · Environment variables · Launching external commands · Walking directory trees · Paths, directories, and filenames · Working with file systems · Dates and times

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File Input and Output and Exception

TOPICS

- The open Functions
- Input from Text Files
- Storing Complex Data in Files with Pickles and Shelve
- Handling Exceptions
- Using try Statement with except Clause
- Handling Multiple Exception

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XML and JSON Data

TOPICS

- Working with XML
- DOM
- Introducing ElementTree and xml
- Parsing XML
- Navigating the document
- Creating a new XML document
- JSON
- Parsing JSON into Python
- Converting Python into JSON

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Object Oriented Python

TOPICS

- Introduction to Object Oriented Python
- Creating Classes, Methods and Objects
- Using Constructor and Attributes
- Using Class Attributes and Static Methods
- Understanding Encapsulation
- Private Attribute Access
- Using Inheritance to Create New Classes
- Altering Behaviour of Inherited Methods
- Understanding Polymorphism

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Metaprogramming

TOPICS

Implicit properties · globals() and locals() · Working with attributes · The inspect module · Decorators · Monkey patching

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Database Access

TOPICS

- The DB API
- Available Interfaces
- Connecting to a server
- Creating and executing a cursor
- Fetching data
- Parameterized statements
- Metadata
- Transaction control
- Other DBMS modules

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Network Programming

TOPICS

Sockets · Clients · Servers · Application protocols · Forking servers · Binary data · The struct module

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Multiprogramming

TOPICS

- When to use threads?
- The Global Interpreter Lock
- The threading module
- Simple threading
- Sharing variables
- The queue module
- Debugging threaded programs
- Multiprocessing
- Other alternatives

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Graphical Application Development

TOPICS

- Examining A GUI
- Understanding Event Driven Programming
- Introduction to Tkinter Module
- Using Root Window
- Creating Frames
- Using Labels and Buttons
- GUI Programs with Classes
- Binding Widgets and Event Handlers
- Using Text and Entry Widgets
- Using the Grid Layout Manager
- Using Check and Radio Buttons

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Django Web Framework

TOPICS

Features of Django · Installation of Django · MVC model · HTTP concepts · Views

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Templates and Form

TOPICS

Django Template System · Load Template Files · Create Forms · Process Form Data · Customize Form Field Validation

21

Models

TOPICS

Define Database Models · Use Model Fields · Populate a Database, CURD · Use QuerySets

22

Data Science for AI and Machine Learning Using Python

TOPICS

Foundation of Machine Learning · Supervised Machine Learning - Regression · Machine Learning - Classification · Test Analytics · Time Series

23

Python for Data Analysis - NumPy

TOPICS

Introduction of NumPy · NumPy Array · NumPy Array Indexing · NumPy Operations

24

Python for Data Analysis - Pandas

TOPICS

Introduction to Pandas · Series · DataFrames · Missing Data · Merging Joining and Concatenating · Operations · Data Input and Output

25

Python for Data Visualization - Matplotlib

TOPICS

Introduction to Matplotlib · Matplotlib · Pandas Data Visualization

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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