KOENIG SOLUTIONS · COURSE OUTLINE

Mastering Data Analytics in Python (Advanced Techniques)

Learn to use Python for data analysis, from core syntax to cleaning, transforming, visualising and engineering features from data.

15
MODULES

81
TOPICS

COURSE OVERVIEW

This course begins with Python fundamentals, covering variables, functions, modules, math operations, strings, flow control and regular expressions. It then moves into data analysis, introducing Jupyter and Numpy before covering data acquisition from CSV, JSON and Excel files, data cleaning, transformation and exploratory data analysis. Later modules address data visualisation with Matplotlib, feature engineering for machine learning, and statistics including descriptive and inferential methods, probability distributions and hypothesis testing.

WHO THIS COURSE IS FOR

- **Data Analysts**
- **Python Developers**
- **Data Scientists**
- **Business Analysts**
- **Machine Learning Engineers**

PREREQUISITES

- Knowledge of programming

LEARNING OBJECTIVES

- Apply core Python syntax including variables, functions and modules
- Use regular expressions to match and extract text patterns
- Manipulate arrays using Numpy indexing, slicing and broadcasting
- Read and write data in CSV, JSON and Excel formats
- Identify and correct missing, duplicate and inconsistent data
- Transform and aggregate data using Pandas operations
- Create and enhance charts with Matplotlib
- Explain feature engineering techniques for machine learning

COURSE SYLLABUS

15 Modules, 81 Topics

01

Introduction to Python

TOPICS

- Running Python
- Hello, World!
- Literals
- Python Comments
- Variables
- Conceptual hierarchy and built-in object types
- **Core data types:** int, str, float, bool
- Mutability and immutability

02

Functions and Modules

TOPICS

Defining Functions · Variable Scope · Global Variables · Function Parameters · Returning Values · Importing Modules

03

Math

TOPICS

Arithmetic Operators · Assignment Operators · Built-in Math Functions · The math Module · The random Module

04

Python Strings

TOPICS

- Quotation Marks and Special Characters
- String Indexing
- Slicing Strings
- Concatenation and Repetition
- Common String Methods
- String Formatting
- Formatted String Literals (f-strings)
- Built-in String Functions
- Introduction to Unicode
- ASCII vs Unicode
- Character Encodings
- Unicode Normalization

05

Flow Control

TOPICS

Conditional Statements · Loops in Python · break and continue

06

Regular Expressions

TOPICS

Introduction to Regular Expressions · Overview of regex Syntax and Patterns · Basic Syntax of Regular Expressions · Meta Characters in Regular Expression

07

Introduction to Python for Data Analysis

TOPICS

- Python's role in data analysis and analytics
- Installing Python and Jupyter Notebook/IDE setup/ Colab Notebook
- Basic syntax, variables, and data types
- **Control structures:** loops, conditionals
- Functions and modular programming
- Error handling and debugging

08

Numpy

TOPICS

Numpy Arrays · Array Indexing · Array Slicing · Array Broadcasting · Mathematical operations and aggregations

09

Data Acquisition and File Handling

TOPICS

Reading from files (CSV, JSON, Excel) · Writing to CSV, JSON, and Excel files · Importing and exporting data

10

Data Cleaning and Standardization

TOPICS

- Handling Missing and Erroneous Data
- Identifying null, duplicate, or inconsistent data
- Imputation techniques and outlier detection

11

Data Transformation

TOPICS

- Reshaping, merging, and aggregating data with Pandas
- Applying string operations and datetime manipulations
- Standardization and scaling techniques

12

Exploratory Data Analysis (EDA)

TOPICS

Descriptive statistics · Data summaries · Grouping · Data aggregation

13

Data Visualization-Matplotlib

TOPICS

- Foundational Visualization Tools
- Creating charts with Matplotlib
- Line Plot
- Bar Plot
- Scatter Plot
- Enhancing plots
- Annotations
- Labels
- Legends

14

Feature Engineering

TOPICS

- Introduction to Feature Engineering
- Importance of Feature Engineering in Machine Learning
- Differences between Raw Data and Features
- Types of Features
- Feature Creation
- Feature Selection
- Feature Transformation

15

Statistics for Data Analysis

TOPICS

- Descriptive and Inferential Statistics
- Measures of central tendency and dispersion
- Probability distributions and hypothesis testing

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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