# Python Fundamentals for Data Science (TTPS4874) Training

Duration: **3 Day**

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## Overview

**New - Getting Started with Python for Engineers - Hands-on Python Basics for Analytics, Scientific and Math Computing | With Numpy, Pandas & More**

Geared for scientists and engineers with limited practical programming background or experience, **Python Fundamentals for Data Science** is a hands-on introductory-level course that provides you with a ramp-up to using Python for scientific and mathematical computing. Working in a hands-on learning environment with both Python scripts and Jupyter notebooks,you'll learn basic Python scripting skills and concepts, as well as the most important Python modules for working with data, from arrays, to statistics, to plotting results.

Throughout the course, guided by our expert instructor, you'll gain a robust skill set that will equip you to make data-driven decisions and elevate operational efficiencies within your organization. You'll explore data manipulation with Pandas, advanced data visualization using Matplotlib, and numerical analysis with NumPy. You'll also delve into best practices for error and exception handling, modular programming techniques, and automated workflow development, equipping you with the skill set to enhance both the effectiveness and efficiency of your data-driven projects.

**Who Should Attend?**

This introductory-level course is designed for technical professionals who are new to Python and want to use it for data analysis and data science workflows. Typical roles include data analysts, engineers, developers, and researchers transitioning from tools such as Excel or SQL.

## Prerequisites

No prior Python experience is required. Familiarity with basic programming or scripting concepts (such as variables and simple logic) is helpful but not required.

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## What You Will Learn

Working in a hands-on learning environment, guided by our expert team, attendees will learn about and explore:

- **Core Python Proficiency**: By the close of the course, participants will have a firm grasp on the foundational elements of Python, such as variables, data types, and flow control, empowering them to write scripts and build simple programs with confidence.
- **Analytical Problem-Solving**: Utilizing libraries such as NumPy, students will develop the ability to perform complex mathematical operations and statistical analyses, significantly amplifying their analytical capabilities for tasks such as data modeling or optimization problems.
- **Data Manipulation Mastery**: By the end of the course, participants will be proficient in employing Pandas to clean, transform, and analyze data sets, enabling them to make data-driven decisions effectively.
- **Automated Workflow Development**: Students will acquire the ability to construct automated scripts using Python's Standard Library, optimizing repetitive tasks and thereby enhancing operational efficiency in their organizations.
- **Advanced Data Visualization**: Upon course completion, learners will be equipped to utilize Matplotlib and other Python libraries to craft intricate visual representations of data, facilitating clearer and more impactful reporting and presentations.
- **Error-Resilient Coding**: Attendees will learn best practices for implementing robust error and exception handling techniques, leading to the creation of more stable and secure Python applications.
- **Modular Programming Proficiency**: By mastering Python functions, modules, and packages, students will be adept at developing modular and maintainable code, a key skill for scalability and collaborative programming projects.

## Outline

1. **Getting Started with the Python Environment**
   - Starting Python
   - Using the interpreter
   - Running a Python script
   - Editors and IDEs
2. **iPython and Jupyterlab**
   - iPython features & iPython "magic" commands
   - iPython configuration
   - Creating Jupyter notebooks
   - Managing notebooks with Jupyterlab
3. **Variables and Values**
   - Using variables
   - Builtin functions
   - String data
   - Numeric data
   - Converting types
4. **Basic input and output**
   - Writing to the screen
   - String formatting
   - Command line arguments
   - Reading the keyboard

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5. **Flow Control**
   - About flow control
   - The if statement
   - Relational and Boolean values
   - while loops
   - Exiting from loops
6. **Array types**
   - Sequence types in general
   - Lists and list methods
   - Tuples
   - Indexing and slicing
   - Iterating through a sequence
   - Sequence functions, keywords, and operators
   - List comprehensions and generators
7. **Working with files**
   - File I/O overview
   - Opening a text file
   - Reading a text file
   - Writing to a text file
8. **Dictionaries and Sets**
   - About dictionaries
   - Creating dictionaries
   - Getting values
   - Iterating through a dictionary
   - About sets
   - Creating sets
   - Working with sets
9. **Functions, modules, and packages**
   - Returning values
   - Types of function parameters
   - Variable scoping
   - Documentation best practices
   - Creating and importing modules
   - Organizing modules into packages
10. **Intro to Pandas**
    - Pandas overview
    - Series and Dataframes
    - Reading and writing data
    - Data summaries
    - Data alignment and reshaping
    - Selecting and indexing
    - Basic Data Plotting
11. **Matplotlib**
    - Creating a basic plot
    - Commonly used plots
    - Ad hoc data visualization
    - Leveraging Seaborn for better plots
    - Exporting images
12. **Intro to NumPy**
    - NumPy basics
    - Reading Data
    - Creating arrays

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- Indexing and slicing
- Large number sets
- Transforming data