



# Applied Python for Data Science & Engineering

Essential Python for Analytics, Scientific and Math Computing | With Numpy, Pandas & More

[www.triveratech.com](http://www.triveratech.com)

## Course Snapshot

- **Course: TTPS4874: Applied Python for Data Science & Engineering**
- **Duration:** 4 days
- **Audience & Skill-Level:** This is an **introductory-level** course appropriate for data analysts, developers, engineers or anyone new to Python, tasked with utilizing Python for data analytics tasks. Prior scripting experience is helpful but not required.
- **Hands-on Learning:** This course is approximately **50% hands-on**, combining expert lecture, real-world demonstrations and group discussions with machine-based practical labs and exercises. Student machines are required.
- **Delivery Options:** This course is available for **onsite private classroom presentation, live online virtual presentation**, or can be presented in a **flexible blended learning format** for combined onsite and remote attendees. Please also ask about our **Self-Paced / Video / QuickSkills or Mini-Camp Flex Hours / Short Course** options.
- **Public Schedule:** This course has active dates on our live-online open enrollment **Public Schedule**.
- **Customizable:** This course agenda, topics and labs can be further adjusted to target your specific training skills objectives, tools and learning goals. Please inquire for details.

## Overview

Geared for scientists and engineers with limited practical programming background or experience, **Applied Python for Data Science & Engineering** is a hands-on introductory-level course that provides a ramp-up to using Python for scientific and mathematical computing. Students will explore basic Python scripting skills and concepts, and then explore the most important Python modules for working with data, from arrays, to statistics, to plotting results. Prior scripting experience is helpful but not required.

## Learning Objectives

This course is approximately **50% hands-on**, combining expert lecture, real-world demonstrations and group discussions with machine-based practical labs and exercises. Our engaging instructors and mentors are highly experienced practitioners who bring years of current "on-the-job" experience into every classroom. Working in a hands-on learning environment, guided by our expert team, attendees will learn how to:

- Learn essentials Python scripting methods to create and run basic programs
- Design and code modules and classes
- Implement and run unit tests
- Use benchmarks and profiling to speed up programs
- Process XML, JSON, and CSV
- Manipulate arrays with NumPy
- Get a grasp of the diversity of subpackages that make up SciPy
- Use Series and Dataframes with Pandas
- Use Jupyter notebooks for ad hoc calculations, plots, and what-if?

**Need different skills or topics?** If your team requires different topics or tools, additional skills or custom approach, this course may be further adjusted to accommodate. We offer additional python, data science, AI, machine learning, web development, data science, machine learning and other related topics that may be blended with this course for a track that best suits your needs. Our team will collaborate with you to understand your needs and will target the course to focus on your specific learning objectives and goals.

## Audience & Pre-Requisites

This course is geared for data analysts, developers, engineers or anyone tasked with utilizing Python for data analytics tasks. While there are no specific programming prerequisites, students should be comfortable working with files and folders and the command line. Prior scripting experience is helpful but not required.

**Follow On Courses:** Our core Python and data science training courses provide students with a solid foundation for continued learning based on role, goals, or their areas of specialty. Our learning paths offer a wide variety of related follow-on courses such as:

- TTPS4876 Next Level Python in Data Science (Intermediate) | Numpy, Pandas, Spark, TensorFlow & More (5 days)
- TTML5506-P Machine Learning Essentials with Python (3 days)
- Please see the **Python Training Suite** list for additional topics and titles.

**Enhanced Learning Services:** Please also ask about our **Pre-Training Class OnRamp & Prep / Primer** offerings, **Skills Gap Assessment Services, Case Studies, Knowledge Check Quizzes, Skills Immersion Programs & Camps, Collaborative Mentoring Services and Extended Learning Support & Post Training** services.

---

## Course Topics / Agenda

*Please note that this list of topics is based on our standard course offering, evolved from typical industry uses and trends. We'll work with you to tune this course and level of coverage to target the skills you need most. Topics, agenda and labs are subject to change, and may adjust during live delivery based on audience needs and skill-level.*

### 1. The Python Environment

- About Python
- Starting Python
- Using the interpreter
- Running a Python script
- Python scripts on Unix/Windows
- Using the Spyder editor

### 2. Getting Started

- Using variables
- Builtin functions
- Strings
- Numbers
- Converting among types
- Writing to the screen
- String formatting
- Command line parameters

### 3. Flow Control

- About flow control
- White space
- Conditional expressions (if,else)
- Relational and Boolean operators
- While loops
- Alternate loop exits

### 4. Array Types

- About sequences
- Lists
- Tuples
- Indexing and slicing
- Iterating through a sequence
- Using enumerate()
- Functions for all sequences
- Keywords and operators for all sequences
- The range() function

- Nested sequences
- List comprehensions
- Generator expressions

### 5. Working with files

- File overview
- Opening a text file
- Reading a text file
- Writing to a text file
- Raw (binary) data

### 6. Dictionaries and Sets

- Creating dictionaries
- Iterating through a dictionary
- Creating sets
- Working with sets

### 7. Functions, modules, and packages

- Four types of function parameters
- Four levels of name scoping
- Single/multi dispatch
- Relative imports
- Using `__init__` effectively
- Documentation best practices

### 8. Errors and Exception Handling

- Syntax errors
- Exceptions
- Using try/catch/else/finally
- Handling multiple exceptions
- Ignoring exceptions

### 9. Using the Standard Library

- The sys module
- Launching external programs
- Walking directory trees

- Grabbing web pages
- Sending e-mail
- Paths, directories, and filenames
- Dates and times
- Zipped archives

### 10. Pythonic Programming

- The Zen of Python
- Common idioms
- Named tuples
- Useful types from **collections**
- Sorting
- Lambda functions
- List comprehensions
- Generator expressions
- String formatting

### 11. Introduction to Python Classes

- Defining classes
- Constructors
- Instance methods and data
- Attributes
- Inheritance
- Multiple inheritance

### 12. Developer tools

- Program development
- Comments
- pylint
- Customizing pylint
- Using pyreverse
- The unittest module
- Fixtures
- Skipping tests
- Making a suite of tests
- Automated test discovery
- The Python debugger

- Starting debug mode
  - Stepping through a program
  - Setting breakpoints
  - Profiling
  - Benchmarking
- 13. Excel spreadsheets**
- The **openpyxl** module
  - Reading an existing spreadsheet
  - Creating a spreadsheet from scratch
  - Modifying an existing spreadsheet
  - Setting Styles
- 14. Serializing Data**
- Using ElementTree
  - Creating a new XML document
  - Parsing XML
  - Finding by tags and XPath
  - Parsing JSON into Python
  - Parsing Python into JSON
  - Working with CSV
- 15. iPython and Jupyter**
- iPython features
  - Using Jupyter notebooks
  - Benchmarking
  - External Commands
  - Cells
  - Sharing Notebooks
- 16. Introduction to NumPy**
- NumPy basics
  - Creating arrays
  - Shapes
  - Stacking
  - Indexing and slicing
  - Array creation shortcuts
  - Matrices
  - Data Types
- 17. Brief intro to SciPy**
- What is SciPy?
  - The Python science ecosystem
  - How to use SciPy
  - Getting Help
- SciPy subpackages
- 18. Intro to Pandas**
- Pandas overview & architecture
  - Series
  - Dataframes
  - Reading and writing data
  - Data alignment and reshaping
  - Basic indexing
  - Broadcasting
  - Removing Entries
  - Timeseries
  - Reading Data
- 19. Introduction to Matplotlib**
- Overall architecture
  - Plot terminology
  - Kinds of plots
  - Creating plots
  - Exporting plots
  - Using Matplotlib in Jupyter
  - What else can you do?

---

**Student Materials:** Each participant will receive a **Student Guide** with course notes, code samples, software tutorials, step-by-step written lab instructions, diagrams and related reference materials and resource links. Students will also receive the project files (or code, if applicable) and solutions required for the hands-on work.

**Hands-On Setup Made Simple!** We offer several flexible student machine setup options including **guided manual set up** for simple installation directly on student machines, or 'easy-access' **cloud based / remote hosted lab solutions** where students can log in to a complete separate lab environment minus any installations. Our dedicated tech team will work with you to ensure your environment is accessible, fully-tested and verified as ready to go well in advance of the course start date, ensuring a smooth start to class and effective learning experience for all participants. Please inquire for details and options.

### For More Information

All courses can be presented **onsite** or **online**, or in a **combined / flex / blended learning format**, tailored to target your specific audience, needs and learning goals. We also offer focused, flexible **short courses, self-paced learning options, recorded sessions** and more. We train beginner to advanced skills in all areas we cover, and offer **New Hire / Cohort Training, Boot Camps, Skills Immersion Programs, Reskilling Programs, Skills Migration & Transition Programs**, and more. We collaborate with you to ensure all courses are truly targeted to meet your specific needs and learning skills, maximizing your valuable training time, as well as your important budget.

Please also visit our extensive **Public Training Schedule** for training for smaller groups or individuals. Please contact us for course details, **Corporate Rates** and **Special Discount Offers**.

**For more information** about our dedicated training services, collaborative coaching services, courseware licensing and development services, public course schedule, training management services, partner programs, or to see our complete list of course offerings and special offers please visit us at [www.triveratech.com](http://www.triveratech.com), email [Info@triveratech.com](mailto:Info@triveratech.com) or call us toll free at **844-475-4559**. Our pricing and services are always satisfaction guaranteed.

---

TRIVERA TECHNOLOGIES • Collaborative IT Training, Coaching & Skills Development Solutions  
[www.triveratech.com](http://www.triveratech.com) • toll free +1-844-475-4559 • [Info@triveratech.com](mailto:Info@triveratech.com) • Twitter TriveraTech