

## Applied Python for Data Science

### COURSE OVERVIEW:

Geared for scientists and engineers with potentially light practical programming background or experience, Applied Python for Data Scientists is a hands-on Python 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 move to the most important Python modules for working with data, from arrays to statistics, to plotting results.

### WHO WILL BENEFIT FROM THIS COURSE?

This course is geared for data analysts, developers, engineers, or anyone tasked with utilizing Python for data analytics tasks.

### PREREQUISITES:

While there are no specific programming prerequisites, students should be comfortable working with files and folders and should not be afraid of the command line and basic scripting.

### COURSE OBJECTIVES:

Skills-Focused, Hands-On Learning: This course is about 50% hands-on lab to 50% lecture ratio, combining engaging instructor presentations, demonstrations and discussions with extensive machine-based student labs and practical project work. Throughout the course, students will learn to write essential Python scripts and apply them within a scientific framework working with the latest technologies listed on the agenda. Although the course is introductory in nature, it will increase in complexity as more sophisticated skills and techniques are introduced. Students can rely on our highly experienced instructors to provide informed, relatable, 'real-world' answers to their questions.

Working within an engaging, hands-on learning environment, attendees will learn to use Python 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 and JSON
- Manipulate arrays with NumPy
- Get a grasp of the diversity of sub-packages that make up scipy
- Use iPython notebooks for ad hoc calculations, plots, and what-if?
- Manipulate images with PIL
- Solve equations with sympy

### COURSE OUTLINE:

Please note that this list of topics is based on our standard course offering, evolved from typical industry uses and trends. We will 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.

### **Session 1 -- The Python Environment**

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

### **Session 2 -- Getting Started**

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

### **Session 3 -- Flow Control**

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

### **Session 4 -- Sequences**

- About sequences
- Lists and tuples
- Indexing and slicing
- Iterating through a sequence
- Sequence functions, keywords, and operators
- List comprehensions
- Generator expressions
- Nested sequences

### **Session 5 -- Working with files**

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

### **Session 6 -- Dictionaries and Sets**

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

### **Session 7 -- Functions**

- Defining functions
- Parameters
- Variable scope
- Returning values
- Lambda functions

### **Session 8 -- Errors and Exception Handling**

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

### **Session 9 -- OS Services**

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

### **Session 10 – Pythonic idioms**

- Small Pythonisms
- Lambda functions
- Packing and unpacking sequences
- List Comprehensions
- Generator Expressions

### **Session 11 – Modules and packages**

- Initialization code
- Namespaces
- Executing modules as scripts
- Documentation
- Packages and name resolution
- Naming conventions
- Using imports

### **Session 12 -- Classes**

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

### **Session 13 – Developer tools**

- Analyzing programs with pylint
- Creating and running unit tests
- Debugging applications
- Benchmarking code
- Profiling applications

### **Session 14 – XML and JSON**

- Using ElementTree
- Creating a new XML document
- Parsing XML
- Finding by tags and XPath
- Parsing JSON into Python
- Parsing Python into JSON

### **Session 15 – iPython**

- iPython basics
- Terminal and GUI shells
- Creating and using notebooks
- Saving and loading notebooks
- Ad hoc data visualization

### **Session 16 – numpy**

- numpy basics
- Creating arrays
- Indexing and slicing
- Large number sets
- Transforming data
- Advanced tricks

### **Session 17 – scipy**

- What can scipy do?
- Most useful functions
- Curve fitting
- Modeling
- Data visualization
- Statistics

### **Session 18 – A tour of scipy sub-packages**

- Clustering
- Physical and Mathematical Constants
- FFTs
- Integral and differential solvers
- Interpolation and smoothing
- Input and Output
- Linear Algebra

- Image Processing
- Distance Regression
- Root-finding
- Signal Processing
- Sparse Matrices
- Spatial data and algorithms
- Statistical distributions and functions
- C/C++ Integration

#### **Session 19 – pandas**

- pandas overview
- Dataframes
- Reading and writing data
- Data alignment and reshaping
- Fancy indexing and slicing
- Merging and joining data sets

#### **Session 20 – matplotlib**

- Creating a basic plot
- Commonly used plots
- Ad hoc data visualization
- Advanced usage
- Exporting images

#### **Session 21 -- The Python Imaging Library (PIL)**

- PIL overview
- Core image library
- Image processing
- Displaying images

#### **SUNSET LEARNING INSTITUTE (SLI) DIFFERENTIATORS:**

Sunset Learning Institute (SLI) has been an innovative leader in developing and delivering authorized technical training since 1996. Our goal is to help our customers optimize their cloud technology investments by providing convenient, high quality technical training that our customers can rely on. We empower students to master their desired technologies for their unique environments.

What sets SLI apart is not only our immense selection of trainings options, but our convenient and consistent delivery system. No matter how complex your environment is or where you are located, SLI is sure to have a training solution that you can count on!

#### **Premiere World Class Instruction Team**

- All SLI instructors have a four-year technical degree, instructor level certifications and field consulting work experience.
- Sunset Learning has won numerous Instructor Excellence and Instructor Quality Distinction awards since 2012

### **Enhanced Learning Experience**

- The goal of our instructors during class is ensure students understand the material, guide them through our labs and encourage questions and interactive discussions.

### **Convenient and Reliable Training Experience**

- You have the option to attend classes at any of our established training facilities or from the convenience of your home or office with the use of our HD-ILT network (High Definition Instructor Led Training)
- All Sunset Learning Institute classes are guaranteed to run – you can count on us to deliver the training you need when you need it!

### **Outstanding Customer Service**

- Dedicated account manager to suggest the optimal learning path for you and your team
- Enthusiastic Student Services team available to answer any questions and ensure a quality training experience