Trivera Technologies LLC

Collaborative IT Training, Mentoring & Courseware Solutions
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Trivera
TECHNOLOGIES

Applied Python for Scientists & Engineers

Web Development & Scripting Series | Python Programming Training

Course: TTPS4870 Applied Python for Scientists and Engineers
Duration: 5 days
Skill Level: Introductory
Skill Level: Introductory and beyond
Hands-On Format: This hands-on class is approximately 50/50 lab to lecture ratio, combining engaging lecture, demos, group activities and discussions with comprehensive machine-based practical programming labs and project work.
Delivery Format: We're flexible! This course is available for onsite private classroom presentation, or live online virtual presentation, or can be presented in a combined delivery learning solution. Please also visit our Public Schedule for open-enrollment course dates.
Customizable: This course may be easily tailored to target your specific training skills objectives, tools of choice and learning goals.

Geared for scientists and engineers with possibly lighter programming background, *Applied Python for Scientists and Engineers* is a hands-on Python programming training course that provides a ramp-up to using Python for scientific and mathematical computing. Starting with the basics, it progresses to the most important Python modules for working with data, from arrays, to statistics, to plotting results.

▶ Course Objectives: What You'll Learn

Working within in an engaging, hands-on learning environment, guided by our expert Python practitioner, 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 subpackages that make up **scipy**
- Use iPython notebooks for ad hoc calculations, plots, and what-if?
- Manipulate images with PIL
- Solve equations with sympy

Need different skills or topics? If your team requires different topics or tools, additional skills or custom approach, this course may be easily adjusted to accommodate. We offer additional Python programming courses which may be blended with this course for a track that best suits your development objectives.

Course Structure: Throughout the course students will be led through a series of progressively advanced topics, where each topic consists of lecture, group discussion, comprehensive hands-on lab exercises, and lab review. This course is "skills-centric", designed to train attendees in essential Python and web development skills, coupling the most current, effective techniques with the soundest coding practices.

Hands- on Learning: This course is about **40% hands-on lab and 60% lecture,** with extensive programming exercises designed to reinforce fundamental skills and concepts learned in the lessons. **Students will write Python scripts** to reinforce the major concepts covered in this course. The courses will increase in complexity as

more sophisticated techniques are introduced. Our courses include ample materials and labs to ensure all students are either appropriately challenged, or assisted, at all times – no matter their skill level.

▶ Audience: Who Should Attend

While there are no programming prerequisite, programming experience is helpful. Students should be comfortable working with files and folders, and should not be afraid of the command line.

We will collaborate with you to design the best solution to ensure your needs are met, whether we customize the material, or devise a different educational path to help your team best prepare for this training.

▶ Related Courses: Pre-Requisites & Learning Path

Take Instead: We offer other courses that provide different levels of knowledge or focus:

- TTEY101 Introduction to Python Programming (3 days)
- TTPS4810: Python Programing Essentials (4 days - subset)
- TTPS4820 Mastering Python Programming (5 days)

Take After: We offer a variety of introductory through advanced web development, programming, design and mobile development courses and learning tracks. Some recommended follow-on courses include:

- TTPS4850: Advanced Python Programming (4 days)

Please contact us for recommended next steps tailored to your longer term education, project, role or web development objectives. We will collaborate with you to design the best solution to ensure your needs are met, whether we customize the material, or devise a different educational path to help your team best prepare for this training.

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▶ Workshop Topics Covered

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
- Builtin 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 inheritance

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
- iiPython 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 subpackages
- 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

Python Programming Training Series

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- 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

▶ Student Materials: What You'll Receive

Our robust course materials include much more than a simple slideshow presentation handout. Student materials include a comprehensive hard-copy course manual, complete with detailed course notes, detailed lab manuals and workbooks, code samples, software tutorials, diagrams and current reference materials, all directly related to the course at hand, indexed for ease of use. Step-by-step lab instructions, software tutorials and project descriptions are clearly illustrated and commented for maximum learning.

▶ Setup Made Simple!

Our mission is to ensure a smooth start to your course with minimum set up burden for your team or firm. We offer several course set up options to help meet that goal. Please inquire for details on requirements and costs.

- **Manual Course Setup.** Our team provides a detailed setup guide with specific instructions, packaged software and links for all course tools and labs, as well as much live assistance as required to prepare your attendees or classroom for the course.
- **Remote Lab Environment**. Your team can access our hosted environment to access and use the software, labs and tools required for the hands-on portion of the training.
- **Provide Pre-Loaded Equipment**. If needed, we can ship in pre-loaded equipment to your site.

▶ Focused, Skills-Driven Training | Maximizing Your Training Time and Value, while Reducing Risk

Our training programs are designed to be skills-driven, focused events, targeted to deliver the true skills you need to succeed in

your projects and role. We'll work with you to ensure that your valuable training time and dollar is truly maximized. If your team requires more or less advanced materials or additional or custom topics, this course may be easily adjusted to accommodate. We offer and can blend on a wide variety of surrounding and supporting tools and elements to build out a truly robust educational experience, for you, your team, or your entire organization.

Please contact us for details about our **Extended Education Programs** that support, surround, supplement or extend your learning initiatives such as

- **Collaborative mentoring** for your team
- **Pre-and post-training assessments** help place learners on the right path
- Mentored, comprehensive **case-studies** can be woven into your training programs, complete with guided work and instructor interaction
- **Guided or self-paced projects**, homework and exams
- **Interactive, self-paced programs** students
- **Virtual lab hours** and/or constant Mentor access
- Role-basic, Topic-based or Goal-based corporate **Training Roadmap and Learning Paths development**, rollout and support
- Skills-focused custom **New Hire Training Programs** and team **Reskilling initiatives**
- **Learning Management or Vendor Management Services** for your organization
- Plus many additional, flexible learning modules, initiatives and programs that can be delivered across a variety of subjects and modalities, completely tailored for your organization.

▶ Why Choose Trivera Technologies?

Whether you're a manager choosing a training provider or course to bring to your team, an instructor looking for reliable, solid course materials, or a student looking for an exciting, targeted training class to attend or to recommend to your colleagues - *Our single focus is to make YOUR training event or experience a success*. Here's why choosing Trivera Technologies as your **web development training, mentoring and courseware resource** takes the risk right out of your decision making process…

- **Our 'skills-driven' courses are efficient, focused, current and comprehensive.** Our experts target exactly the skills your team needs to succeed in their jobs, projects or roles, rather than taking a 'laundry-list' approach to training, which can often result in overtraining, course overload or overwhelmed students. We'll work with you to define what it is you need to accomplish, and create the right program, training to those goals. Students of all skill levels will be able to hit the ground running with their new skills right after class ends, since the program was correctly designed from the start.

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- **Our content is always updated and ready to go.** Our dedicated course development team keeps our training content, courses and student resources completely updated with the latest skills, industry trends and software editions to ensure your team is always getting the most current information, techniques and skills available.

- **Every training event is Unique and Important!** The Trivera team treats every delivery engagement like a first-run, important event, not simply a staffing assignment. For every class we deliver, our team works closely with yours to ensure that your course runs smoothly from start to finish, and that there are **no surprises** in the classroom for you, your students or the instructors. Our experts work with you to choose the right topics and courses that align with your true skills goals, tuning as needed. We align the best all-around trainer to fit your exact needs – not just whoever happens to be 'on the bench'. We offer pre-reading, quizzes and support resources to help assess and prepare your team for the training, so we can best tune the training and maximize their time in the classroom. We'll ensure that your classroom is set up and ready to go prior to course start. Throughout the course delivery, our instructors constantly evaluate the class delivery and students, tuning topics, activities, discussions and labs as needed to ensure all student skill levels and needs are targeted. All activities, data and results are documented and shared with your firm so you have a complete picture of the course and its results, throughout the course delivery, and afterwards. Post training support is also included for your students to address any future related questions.

- **We wholly-own our course content, giving Trivera flexibility & quality above the rest.** Our course materials are **owned** by our company and *fully customizable at little or no cost*. Dozens of training firms and independent instructors purchase and use our course materials, and hire us for training support as well. As a result, our courseware is subject to very stringent quality requirements. Not only will your organization benefit from our own technical team's technical expertise, but also from the feedback of hundreds of students and trainers using these materials, worldwide, on a regular basis. This unique fact guarantees that our materials are not only robust and interesting, but also technically correct, current and of the highest quality and usability.

- **We bring years of practical, current experience into the classroom and content.** Our dynamic instructors and course authors are also skilled Java, JEE, J2EE, .Net, SOA, and web services developers, architects and security-oriented professionals, currently active in their fields. This real-world experience translates directly to your classroom, and into our course materials.

- **We're Java & JEE authors and industry speakers.** Our team was selected to write the online *JEE, EJB, EJB CMP-CMR* and *Web Services Tutorial Series for IBM developerWorks®.* These are the same instructors who train our classes and author the courseware. Most of our trainers/consultants have also authored additional articles on web services, EJB, Struts, JEE and advanced Java topics, and are recognized speakers and presenters on the industry technical seminar circuit. Our team is comprised on several successful published authors. Members of our team have written or contributed to: *Eclipse Kick Start, Mastering Eclipse; Professional Jakarta Struts; Using Java Tools for Extreme Programming; Mastering Resin; Mastering TomCat and others.*

- **Need a small-business status with whom to team?** Trivera Technologies is a 100% Woman-Owned Small Business Concern. Please contact us to team with us for your small-business or woman-owned set aside opportunities.

- *Our prices and services are guaranteed.* We stand behind our courses and instructors 100%. We'll match or beat any pricing for similar services, any time. Whether you're a stakeholder organizing your firm's educational services, a student in our live or virtual classroom or a trainer using our materials to educate your own client or team – **Our core mission is to make YOU a success in the classroom**.

▶ **For More Information**

For more information about our training services, collaborative mentoring services, courseware licensing options, courseware development services, public course schedule, training management services, partner and reseller programs, or to see our complete list of course offerings please visit us at **www.triveratech.com**, email **Info@triveratech.com** or call **609.953.1515**.

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