Training: Python Academy
Python for Scientists and Engineers

TRAINING GOALS:

Learning how to adapt **Python** potential in creating efficient solutions to every-day engineering and scientific problems. Overwiew of scientific and technical libraries for Python and methods of data persistence. Getting known with NumPy and SciPy - numerical libraries developed to serve huge amount of high quality, boilerplate code. Using Matplotlib and MayaVi for clear visualisation of experiment results.

Many problems that scientists and engineers need to solve require some kind of programming. Python is getting increasingly popular among this kind of users. One reason is the relatively little effort compared to the results. For people who only program occasionally Python is also a good choice. Even after a longer time without touching Python source it can still be read and understood with little effort.

CONSPECT:

- Overwiew of scientific and technical libraries for Python
- Numerical calculations with NumPy
  - Standard arrays and linear algebra library
  - Array-constructions and array-properties in examples
  - Speed comparison between dynamically determined Python data types with explicitly specified NumPy arrays
  - Correspondence between NumPy and C data types
- Slicing and Broadcasting
  - Reading and writing to arbitrary parts of arrays
  - Applying broadcasting for arrays with different shapes
- Universal Functions
  - Applying many operations on whole arrays independent from their dimensions
  - Examples of use
- Numerical Algebra
- Storage and processing of large amounts of data
  - ASCII Files - techniques for conversion of cloumn based data in Python data structures are given
  - Excel Files - access via Microsoft's COM interface, binary reading and writing of files as a platform indepentend solution

Compendium Education Center Ltd.
ul. Tatarska 5, 30-103 Kraków, tel.: (12) 298 47 77
ul. Bielska 17, 02-394 Warszawa, tel.: (22) 417 41 70

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- HDF5 Files - similar purposes as the NetCDF-Format. Using PyTables as a mature and comfortable interface to HDF
- Databases - using Python's uniform API for accesing all major databases.
- Picking and shoveling - using built-in Python persistence methods. Presentation of advantages and disadvantages of that technique.

- Object-oriented programming for scientific and technical projects
- Graphical presentation of scientific data
  - MatplotLib - library that provides many different types of diagrams from within Python with only a few lines of code.
  - MayaVi - Three-dimensional visualization and animation software - standalone usage is taught in the course as well as the automation from within a Python program.
- Application integration with Python
  - Usage of Python as "glue language" for the connection of heterogeneous applications.
  - Examples of connecting very different applications into one uniform program.
- Open time for solving participant's problem
  - Participants are asked before the course to provide tasks that they usually need to solve at work. Solution strategies with Python are attempted in the course.

REQUIREMENTS:

- Basic knowledge of **Python**.

Difficulty level

CERTIFICATE:

The participants will obtain certificates signed by Python Academy.

TRAINER:

Authorized Python Academy Trainer.

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