



Course on:
An introduction to Python for
economic research



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Outline

This course is oriented to all those post-graduate students and/or researchers in Economics/Business interested in mastering a multi-purpose tool for their analysis and research endeavours, both of theoretical and empirical nature. A secondary target audience for this course are those post-graduate students/researchers whose interests fall in the specialized areas (data analysis, Bayesian statistics, machine learning, customized numerical computation) where Python is a leading working tool.

Python is a free, open source, general purpose programming language conceived in 1989 by Dutch programmer Guido van Rossum. Community-based development of the core language is coordinated through the Python Software Foundation. Python has a relatively small core language supported by a vast collection of standard and external software libraries. Due to its elegant syntax (easy to read and easy to remember), Python has experienced rapid adoption in the last decade, and is now one of the most popular programming languages. Over the last decade, Python has become one of the core languages of scientific computing, because it offers a great deal of power to analyse and model scientific data with relatively little overhead in terms of learning, installation or development time. However, the use of Python across the Economics/Business research community is still very limited, with the exception of some very specialized tasks.

Being introduced to a mature tool like Python offers all the advantages of open source alternatives without any of the drawbacks usually associated with them. The Python scientific environment is free, focused on the production of reproducible research and on seamless communication with other software tools, both open-source and commercial, and it is endowed with a growing community of users/developers that provide high-quality support services. The availability of free off-the-shelf distributions like Anaconda including all the basic libraries required for scientific work, and of flexible and powerful user interfaces like the Jupyter Notebook make working with Python in Economics/Business research easy.

Contents

Session 1: Python Basics 1 (4 hours)

1. Installation: The Anaconda Distribution
2. Working with the Jupyter Notebook
3. Python Data Types
4. Basic Python Structures: Lists, Tuples, Dictionaries
5. Some Basic Python Procedures: Iterations, Slicing, Conditionals
6. A Glimpse of Further Horizons: Functions, Classes, Object-Oriented Programming

Session 2: Computing with Python: The NumPy Library (4 hours)

1. Working with Vectors and Matrices: The NumPy Array
2. Array Indexing and Slicing
3. Basic and Useful Array Methods
4. Linear Algebra with NumPy
5. Hands-On: A Simple Input-Output Model

Session 3: Working with Data: The Pandas Library (4 hours)

1. Organizing Data with Pandas: The Pandas DataFrame
2. Indexing and Slicing, but now with Data Frames
3. Reshaping, Pivoting, Stacking, Dealing with Missing Data and other Useful but Tedious Tasks.
4. Time Series Methods in Pandas.

5. Hands-On: Requesting and Organizing Data from a Statistical Web Page

Session 4: An Introduction to Statistics and Econometrics with Python (4 hours)

1. The Statsmodels Library
2. How to Make Linear Regressions with Statsmodels
3. Statistic Tests with Statsmodels
4. A Glimpse of Further Horizons: Time Series, Nonparametric Methods
5. Hands-On: Replicating a Simple Econometric Exercise

Session 5: Visualization Tools (4 hours)

1. Plotting Data with the Matplotlib Library
2. Other Visualization Options: the Seaborn and Altair Libraries
3. Creating Maps with Python: Basemap, Cartopy, Geoviews
4. Hands-On: Creating a Choropleth Map from Scratch