

Python Programming Workshop for Business, Finance and Economics

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About Python

Modern, high level, free and open source, general purpose programming language.

Used extensively by:

- ▶ Tech firms (e.g. Google, Instagram, Spotify, Dropbox, Reddit);
- ▶ Finance industry (e.g. hedge funds);
- ▶ Research agencies (e.g. NASA, CERN);
- ▶ Academia.

Why Python?

Python is a free and open source programming language:

- ▶ **Free** as in freedom (libre);
- ▶ **Free** as in "free food" (gratis).

This means:

- ▶ Free to install and use;
- ▶ No license issues;
- ▶ Source code can be freely read, modified and shared.

Why Python?

- ▶ Simple to learn;
- ▶ Clean, elegant and very readable syntax;
- ▶ High productivity;
- ▶ Vast collection of libraries for almost everything;
- ▶ Powerful enough for scientific computing;
- ▶ Relatively simple tweaks offer performance comparable to compiled languages such as C and Fortran.

Why Python?

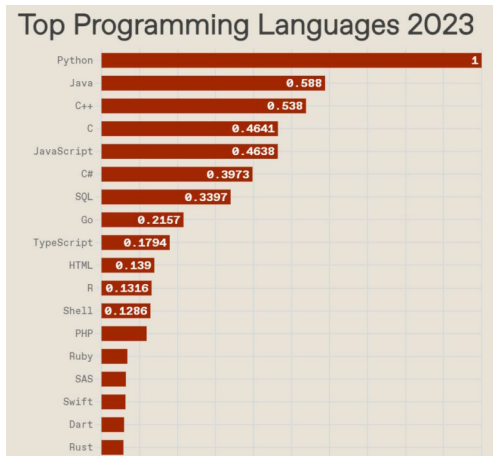


Figure: IEEE overall ranking, 2023

Why Python?











Feb 2024	Feb 2023	Change	Programming Language		Ratings	Change
1	1			Python	15.16%	-0.32%
2	2			C	10.97%	-4.41%
3	3			C++	10.53%	-3.40%
4	4			Java	8.88%	-4.33%
5	5			C#	7.53%	+1.15%
6	7	▲		JavaScript	3.17%	+0.64%
7	8	▲		SQL	1.82%	-0.30%
8	11	▲		Go	1.73%	+0.61%
9	6	▼		Visual Basic	1.52%	-2.62%
10	10			PHP	1.51%	+0.21%

Figure: TIOBE index top 10 languages, February 2024.

Why Python?

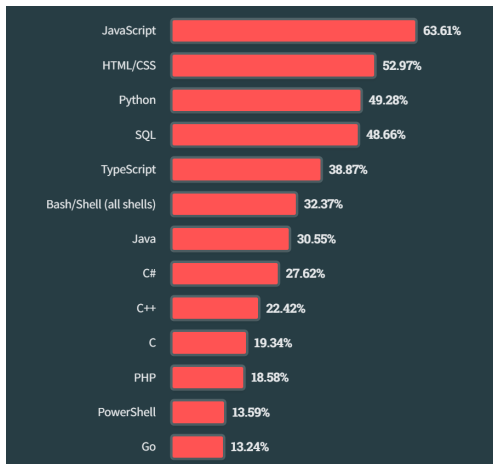


Figure: Most Popular Languages. Source: Stack Overflow Survey 2023

Major Scientific Computing and Data Analysis Libraries

- ▶ **Numpy**: basic data types, array operations.
- ▶ **Scipy**: high-level numerical routines (e.g. integration, interpolation, optimization).
- ▶ **Matplotlib**: plotting 2D and 3D figures.
- ▶ **Sympy**: symbolic math computations (similar to Maple/Mathematica).
- ▶ **Pandas**: data manipulation.
- ▶ **Statsmodels**: statistics and econometrics.
- ▶ **Scikit-learn**: machine learning.
- ▶ **TensorFlow**: machine learning.
- ▶ **Numba**: just-in-time compilation for higher performance.

Objectives and Agenda

► Objectives:

1. Overview of Python.
2. Examples and applications.
3. Discussion.
4. Resources for further study.

► Agenda:

1. Day 1 - Core Python: data types and structures, basic operations, input-output, control flow, functions.
2. Day 2 - Scientific libraries: Numpy, Matplotlib, Scipy.
3. Day 3 - Data science: Pandas, statsmodels.

Getting started

It is strongly recommended to install one of the many Python distributions (e.g. Anaconda, Canopy) and to choose a good programming interface (e.g. Jupyter Lab, VScode, Spyder, PyCharm).

For this class, we will be using:

- ▶ Anaconda distribution;
- ▶ Jupyter Lab.

Anaconda

Most popular scientific Python distribution!

Installation:

- ▶ Download from <https://www.anaconda.com/download>
- ▶ Installation guide available at https://github.com/maitlahcen/qu_cbe_python_workshop_spring24

Jupyter Lab

For the tutorials, we will use Jupyter Lab:

- ▶ Browser based front-end for over 40 programming languages (e.g. Python, R, Julia, C++);
- ▶ Allows for live code, equations, visualizations and explanatory text.

Jupyter Lab is included in Anaconda:

- ▶ First, install Anaconda
- ▶ In the command line type: `jupyter lab`
- ▶ Alternatively, you can access it through Anaconda Navigator
- ▶ Uses Jupyter notebook files with extension `.ipynb`

Resources

- ▶ Worshop's Github repo:
https://github.com/maitlahcen/qu_cbe_python_workshop_spring24
- ▶ QuantEcon Python lectures:
<https://python-programming.quantecon.org/intro.html>
- ▶ QuantEcon Data Science with Python lectures
<https://datascience.quantecon.org/index.html>
- ▶ A list of additional resources is available on the workshop Github page
https://github.com/maitlahcen/qu_cbe_python_workshop_spring24