Python for Econometrics and Operations Research

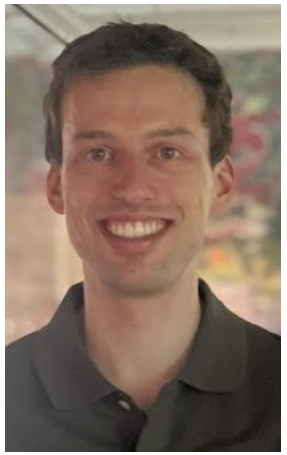
A crash course

Team

Dr.ir. Sander Gribling

Dr.ir. Pieter Kleer

Prof.dr. Johan van Leeuwaarden



Dr.mr. Sven Polak

About Python

Popular programming language for data science tasks

- Plotting, finding roots/minima/maxima, and integration of mathematical high-dimensional functions.
- Mathematical analysis and visualization of large-scale data sets (e.g., Machine Learning).

Developed by Guido van Rossum (initiated at CWI, Amsterdam).

- Name comes from Monty Python's Flying Circus
- British surreal sketch comedy series

Graphing calculator vs. Python

Graphing calculator (high school)
For a function like $\mathrm{f(x)} = x^2 + 2x\ - 1$:

- Plot
- Integrate
- Compute roots
- Compute minimum/maximum

Python
Can handle higher-dimensional problems, e.g., for

$$\mathrm{f(x, y)} = x^2y + 2xy^2 - x - 1$$

Why Python?

Free, open-source and most popular programming language for data science!

Many companies program in Python …

- … including master thesis students who do company internships.

Good skill to have on your CV!

Python and programming in EOR curriculum

- Linear Algebra (Lecture 2 of crash course)
- Computer Programming for EOR (Year 2)
- Computational Aspects in Econometrics (elective, Year 3)

Assignments of:

- **Linear Optimization** (Q2), and *Probability theory, Introduction Finance and Actuarial Sciences, Quantative Finance*

Other programming languages in curriculum

- You will also see programming languages such as Matlab and R:

  - Can perform similar tasks as Python (although “syntax” is different).
- AI-tools like ChatGPT can also program! Not always allowed, though.

Plan for Lecture 1

Go over some basic programming principles.

Materials at https://pskleer.github.io/eor-python-crash-course-2025/

- Lecture 1 covers Chapter 3
- Website contains exercise sheet and these slides