Course Outline

Introduction to Python Programming for Economics & Finance

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May 2023

Monday, 22 May 2023

- **Lecture 1**, 9:00–12:15 (15 min break), Room 305AB

  Unit 1: **Language and NumPy basics** [PDF]

  1. Basic syntax
  2. Built-in data types
  3. NumPy arrays
  4. Optional exercises with provided solutions (asynchronous)

  Unit 2: **Control flow and list comprehensions** [PDF]

  1. Conditional execution
  2. Loops
  3. List comprehensions
  4. Optional exercises with provided solutions (asynchronous)

  Unit 3: **Reusing code – Functions, modules and packages** [PDF]

  1. Functions
  2. Modules and packages
  3. Optional exercises with provided solutions (asynchronous)

- **Lab 1**, 13:30–15:00, Room 305AB
  - Lab exercise for units 1–3

Wednesday, 24 May 2023

- **Lecture 2**, 9:00–12:15 (15 min break), Room 305AB

  Unit 4: **Plotting** [PDF]

  1. Line and scatter plots, categorical data
  2. Labels and annotations
  3. Multiple plots
  4. Optional exercises with provided solutions (asynchronous)

  Unit 5: **Advanced NumPy** [PDF]

  1. Creating and reshaping arrays
  2. Advanced indexing
  3. Numerical operations
  4. Optional exercises with provided solutions (asynchronous)

- **Lab 2**, 13:30–15:00, Room 305AB
  - Lab exercise for units 4–5

Friday, 26 May 2023

- **Lecture 3**, 9:00–12:15 (15 min break), Room 305AB

  Unit 6: **Handling data with pandas** [PDF]

  1. Creating and viewing DataFrames
  2. Indexing
  3. Aggregation and reduction operations
  4. Working with time series data
  5. Visualisation
  6. Optional exercises with provided solutions (asynchronous)

  Unit 7: **Data input and output** [PDF]

  1. I/O with NumPy
  2. I/O with pandas
  3. Retrieving macroeconomic / financial data from the web

- **Lab 3**, 13:30–15:00, Room 305AB
  - Lab exercise for units 6–7

Thursday, 1 June 2023

- **Lecture 4**, 9:00–12:15 (15 min break), Room 305AB

  Unit 8: **Random number generation and statistics** [PDF]

  1. NumPy's RNG routines
  2. Statistics functions in SciPy
  3. Optional exercises with provided solutions (asynchronous)

  Unit 9: **Introduction to unsupervised learning** [PDF]

  1. Principal component analysis (PCA)
  2. Introduction to scikit-learn

  Unit 10: **Introduction to supervised learning** [PDF]

  1. Linear regression models
  2. Ridge regression
  3. Lasso
  4. Hyperparameter tuning

- **Lab 4**, 13:30–15:00, Room 305AB
  - Lab exercise for units 8–10

Friday, 2 June 2023

- **Lecture 5**, 9:00–12:15 (15 min break), Room 305AB

  Unit 11: **Solving models for macroeconomics and household finance** [PDF]

  1. Setting up consumption/savings household problems
  2. Solving deterministic problems with VFI
  3. Solving stochastic problems with VFI

- **Lab 5**, 13:30–15:00, Room 305AB
  - Lab exercise for unit 11

Course material

- All code can be downloaded from GitHub repository
  https://github.com/richardfoltyn/python-intro-PGR
- Interactive notebooks can be launched directly in the browser (see setup guide)