

Week 10: Scientific Programming with SciPy

1. Organisational
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Organisational

Application Lecture Topics

- Experiment Design
- Natural Language Processing
- Webscraping

Final Project Scope:

- GitHub Repo with Python scripts
- Effort of ~1 homework per person
- Uses at least one library from the course

Final Project Deadlines:

- Topic Registration: 15.07.2021
- Hand-In: 15.08.2021
- Grading: 31.08.2021

Final Project Grading Criteria:

- Design: Is it sensibly structured?
- Implementation: Does it work?
- Documentation: Is it understandable?

Resources

- API Documentation: <https://docs.scipy.org/doc/scipy/reference/api.html>
- Submodule Tutorials: <https://docs.scipy.org/doc/scipy/reference/tutorial/index.html>
- Previous Lectures: <https://github.com/scientificprogrammingUOS/lectures>
- Detailed Video Tutorial on SciPy: <https://www.youtube.com/watch?v=jmX4FOUEfgU>

SciPy Stack

SciPy (pronounced “Sigh Pie”) is a Python-based ecosystem of open-source software for mathematics, science, and engineering. In particular, these are some of the core packages:



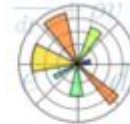
NumPy

Base N-dimensional
array package



SciPy library

Fundamental library
for scientific
computing



Matplotlib

Comprehensive 2-D
plotting

IP[y]:
IPython

IPython

Enhanced interactive
console



SymPy

Symbolic mathematics



pandas

Data structures &
analysis

NUMFOCUS
OPEN CODE • BETTER SCIENCE

Large parts of the SciPy ecosystem (including all six projects above) are fiscally sponsored by NumFOCUS.

SciPy Submodules

Core SciPy Submodules:

- `scipy.linalg`: Linear Algebra
- `scipy.interpolate`: Interpolation
- `scipy.integrate`: Integration and ODEs
- `scipy.optimize`: (Non-Linear) Optimization
- `scipy.spatial`: Spatial Algorithms
- `scipy.stats`: Statistics and Distributions
- `scipy.special`: Special Functions
- `scipy.fft`: Fast Fourier Transform
- `scipy.io`: Utilities for File Handling
- `scipy.cluster`: Clustering Algorithms

Outlook

Application Lectures:

- Week 11: Natural Language Processing
- Week 12: Experiment Design
- Week 13: Webscraping

n = 13

→ 11 assignments have to be passed in order to pass the course

Regular assignment: 2021-homework10 (link now in StudIP announcement)

Bonus assignment: 2021-homework10-bonus (link published on Wednesday)

Final Project Registration Deadline: 15.07.2021 (mail to all of us)