

Scientific Computing using Python

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Python \equiv A programming language that lets you work more quickly and integrate your systems more effectively.

- **Basic Packages**

- `Numpy` for Matlab users

- `Scipy` a collection of open source software for scientific computing

- `Matplotlib` 2D plotting library

- **Oriented Object Programming**

- Encapsulation
 - Inheritance
 - Polymorphism

- **Python as a glue**

- libraries written in C/C++ or Fortran, can be wrapped and used with Python

- **Linear Algebra Packages**

- `petsc4py` a Python wrapper for PetSc
 - `pyamg` an Algebraic Multigrid package

- **High Performance Computing using Python**

- `mpi4py` a Python wrapper for MPI
 - `PyCUDA` access Nvidia's CUDA parallel computation API from Python

- **Documentation using sphinx** generates latex, pdf, html, ...

- **Visualization**

- `mayavi`
 - `pyopengl`

- **Graphical user interface - GUI**

- `wxpython` a wrapper for the cross-platform GUI API
 - `PyQT`, `PySide` bindings for the Qt cross-platform GUI/XML/SQL C++ framework

Using command line (UNIX/MACOS)

```
# install numpy, scipy, matplotlib, notebook, sympy, ...
sudo apt-get install python-numpy python-scipy python-matplotlib ipython ←
    ipython-notebook python-pandas python-sympy python-nose
# install pip
sudo apt-get install python-pip
# install mayavi, mpi4py, pyamg, ...
sudo pip install mpi4py
sudo pip install pyamg
sudo pip install pyopengl
sudo pip install mayavi
# sphinx
sudo pip install sphinx
sudo pip install numpydoc
```

Using Canopy Scientific and Analytic Python Deployment with Integrated Analysis Environment

Academic licence can be downloaded at

<https://store.enthought.com/#canopy-academic>

Using command line

Using command line (UNIX/MACOS)

Using Interactive-Python --- ipython

Using EDI --- canopy

Using EDI --- spyder