

Introduction to Programming and Statistical Analysis with Python

1. Introduction to Programming

- Flowcharts, pseudocodes, and algorithms: from simple tasks to large scale projects.
- Best Practices: writing good codes, maintenance, optimization.
- Debugging Tools and Tips.
- Taking scientific problems to computation.

2. Introduction to Python

- Basics: variables, lists, dictionaries, tuples, file i/o etc.
- Object Oriented Programming: functions, classes and objects.
- Plots, Images and Data visualisation: matplotlib, pyplot & making publication quality plots.
- Modules: numpy, scipy, astropy, aplpy etc.
- Non-scientific Python: games, everyday life, small practical projects, webscraping...

3. Introduction to Statistical Analysis

- Monte Carlo, Markov chain simulations.
- Measurements of error and error propagation
- Parameter estimation: least square method, maximum likelihood method.
- Time Series analysis.

Approximate duration: 1 semester (without many exercises)/ 2 semesters with many exercises.