

# Introduction to the Programming for Oceanography

# Course Objectives

Learning the common concepts of computer programming languages through Python

Learning some of useful Python tools to analyze oceanographic data

# Python Language

**‘a large heavy-bodied nonvenomous constrictor snake’**

“Python is powerful... and fast;  
plays well with others;  
runs everywhere;  
is friendly easy to learn;  
is open.”

<https://www.python.org/about/>



# Python Language (Wikipedia)

Python is a widely used high-level, general-purpose, interpreted, dynamic programming language. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than possible in languages such as C++ or Java.

[https://en.wikipedia.org/wiki/Python\\_\(programming\\_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))

# Python for Science

Perkel (2015). Programming: Pick up Python. Nature, 518.

a general-purpose language (C, C++) vs. MATLAB and R

less painful for beginners to learn than other options.

The community aspect is particularly important to Python's growing adoption.

It also has a very mature package ecosystem around it.

Core packages for scientific programmers: NumPy, SciPy (linear algebra, differential equations), SymPy, matplotlib and pandas.

The Jupyter Notebook (“a coder’s lab notebook” ) allows users to interleave data, code and explanatory text in a single browser-based page, rather than in separate files.

# Some of the core packages (<http://scipy.org>)

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 2D  
Plotting



**IPython**

Enhanced  
Interactive Console



**Sympy**

Symbolic  
mathematics



**pandas**

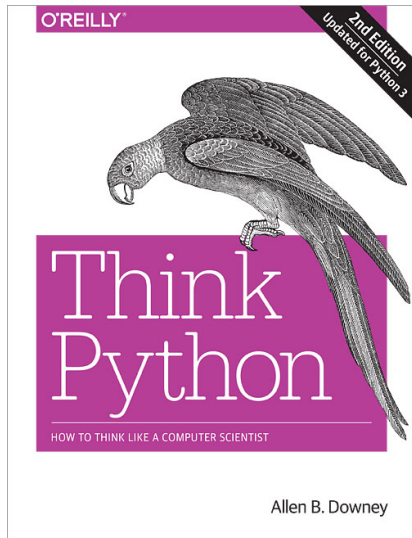
Data structures &  
analysis

<http://www.numpy.org>

<http://matplotlib.org>

<http://ipython.org>

<http://pandas.pydata.org>



Downey, A. B. (2015). Think Python 2e (2nd ed.). O'Reilly Media, Inc..

One of Free Books by Allen Downey.

You can download the PDF at

<http://greenteapress.com/wp/think-python-2e/>

19 chapters in 192 pages.

# Why does Downey write free textbooks?

## **Textbook manifesto**

“Students should read and understand textbooks.”

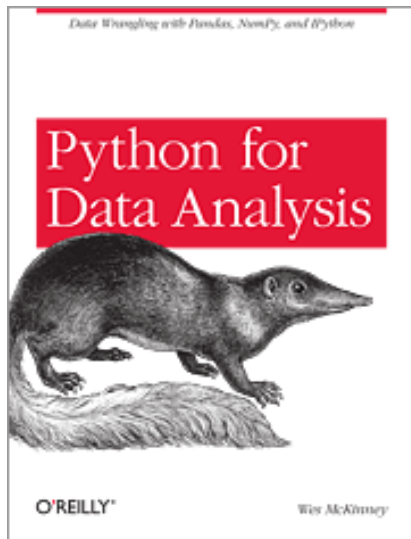
<http://greenteapress.com/wp/textbook-manifesto/>



You are expected to read the textbooks, to run the codes, to summarize the contents, and to submit the summary in Jupyter Notebook format at every class.



## Textbook II



McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. O'Reilly Media, Inc..

a Korean translation of the book

# Setting up a Python Environment

Install 'Anaconda' (Python 3.5) at  
<https://www.continuum.io/downloads>

Navigator, IPython, Spyder, Jupyter

# Jupyter Notebook Tour

'Chapter 1 of Downey (2015).ipynb'

Start from the Help menu

User Interface Tour

Keyboard Shortcuts

# Evaluation

Quizzes and Assignments: 60%

Team project: 30%

Attendance: 10%

# Noteworthy dates

2016-09-15 추석

2016-09-20 Xiamen

2016-09-22 Xiamen

2016-10-25 중간고사

2016-10-27 추계해양학회

2016-12-08 프로젝트 발표

What do you want to do with Python?

# Homeworks

Post a summary of chapter 1 in Jupyter notebook on the class bulletin board (<http://bada.ocean.pusan.ac.kr>)

Bring many questions in the next class