Python for Data Science A-Z

Summer & Fall 2020

# Instructor Information

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| Instructor | Email | Office Hours |
| Keenan M. | keenan@thepythonacademy.com | MWF – 8 to 8:30 pm, after class on Google Hangouts |

# General Information

## Description

This series of classes will cover EVERYTHING you need to know about Python for Data Science. You do not need any background in Python or Data Science to take this class; we will teach you everything from scratch. This bundle includes:

* Foundations of Python
* Python for Data Analysis
* Python for Predictive Modeling
* Python for Machine Learning

## Expectations and Goals

By the end of this class, you will able to analyze complex datasets and create Deep Neural Networks to predict outcomes, along with variants of neural networks such as CNNs and RNNs.

We expect you to attend class, pay attention, and do your homework. If you don’t do your homework or code along in class, you will fall behind and get frustrated. In return, we promise you to give you 100% effort on giving you the most up-to-date material and experience you will need to be successful in the data science field.

# Course Materials

## Required Materials

* You will need to have your own laptop or desktop (we only support troubleshooting for Windows, our staff has limited knowledge of MACs)
* You will receive a free copy of the “Introduction to statistical learning” by Gareth James, freely available on the USC website.

# Course Schedule (next page)

**Week 1**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and reviewed at the beginning of the next class.

* Get Started - Download & Install
* What is Python and why learn it?
* Basic data types
  + Strings
  + Integers
  + Floats
  + Booleans
* Concatenations (str & numbers)
* Lists
* Application of above with Pyautogui (for GUI automation)

**Week 2**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and checked at the beginning of the next class.

* [input()](http://docs.python.org/3.3/library/functions.html?highlight=input#input) function
* Lists (continued)
* If / Then Statements
* CRUD on text file (Create, Read, Update, Delete)
* Application with car sales data

**Week 3**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and checked at the beginning of the next class.

* Dictionaries
* Functions
* Classes
* Try & Except
* Final application of concepts

**Week 4**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and reviewed at the beginning of the next class.

* Welcome to NumPy!
  + NumPy arrays
  + NumPy Operations
* Introduction to Pandas
  + Series
  + Dataframes
  + Missing data

**Week 5**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and checked at the beginning of the next class.

* Introduction to pandas (continued)
  + Group by
  + Merging, joining, concatenating
  + Operations
  + IO
* Pandas exercises
* Python for Data Visualization
  + Matplotlib
  + Seaborn

**Week 6**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and checked at the beginning of the next class.

* Linear regression with sklearn
* Geographical Plotting
* Data Capstone Project

**Week 7**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and reviewed at the beginning of the next class.

* Introduction to Data Modeling
* Monte Carlo Simulation
* Linear Regressions
* Cross Validation and Bias Variance Trade Off

**Week 8**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and checked at the beginning of the next class.

* Logistic Regression
* K nearest neighbors
* Time series analysis
  + Seasonal Decomposition
  + Holt-Winters model
  + Exponential smoothing

**Week 9**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and checked at the beginning of the next class.

* Decision Trees and Random Forests
* Recommender Systems
* Natural Language Processing

**Week 10**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and reviewed at the beginning of the next class.

* Introduction to Deep Learning
  + Perceptron model
  + Activation functions
  + Backward propagation
  + Cost functions and gradient descents
* Review of machine learning statistics
  + Matrix multiplication
* Artificial Neural Network with Tensorflow

**Week 11**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and checked at the beginning of the next class.

* Data Preparation
* Creating training of the model
* Model Evaluation
* Exploratory data analysis
* EDA and preprocessing

**Week 12**

The following topics are covered in this class. All topics are covered with real life examples and applications of the topic. Homework is always given after the class and checked at the beginning of the next class.

* Classification
* Dealing with overfitting
* Multi-class problems
* Natural Language Processing