An Introduction to Data Analysis using Python

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Course Description

This course introduces beginner level programmers to efficiently manipulating and plotting data. Python and its libraries will be the main focus of this course, including but not limited to pandas, NumPy, SymPy, Matplotlib, and Plotly. Other free and open-source tools/software include Jupyter Notebook, VsCode/VsCodium LaTex/TexStudio, git/GitHub, vector images/Inkscape. Topics include functions, data frames, title generation, timestamp manipulation, NumPy math, matrix algebra, static and interactive plotting.

Required Materials

- Python 3 via Anaconda Navigator (https://www.anaconda.com/products/individual)

- Plotly Library (https://plotly.com/python/getting-started/)

- git (Either through terminal or git software) (https://git-scm.com/downloads) (https://git-scm.com/downloads/guis)

- Latex (TexLive (https://www.tug.org/texlive/) or MiKTeX (https://miktex.org/))

- TexStudio (https://www.texstudio.org/)

- VsCode (https://code.visualstudio.com/) or VsCodium (https://vscodium.com/)

- Inkscape (https://inkscape.org/)

Course Objectives

1. Learn the Python Syntax

2. Understand what a DataFrame is

3. Clean and Manipulate Data using a Pandas DataFrame

4. Have the basic understandings of the NumPy Library

5. Learn how to implement NumPy Math on a Pandas DataFrame

6. Use NumPy and SymPy for Matrix Algebra

7. Understand the concept of Vector Images

8. Understand the concept of git and Version Control

9. Learn how to collaborate with git using GitHub

10. Learn how to do a basic Plot in Plotly

11. Auto generate titles for plots

12. Create elaborate plots that contain multiple data sets

13. Learn how to use functions and for loops to streamline the production of plots

14. Use high-quality plots and Latex to create journal-worthy papers and high-quality reports

15. Learn how to have fun with data science and plotting

The schedule is tentative and subject to change. The learning goals below should be viewed as the key concepts you should grasp after each week.