

ELEC 576 / COMP 576 – Fall 2024

Assignment 0

Due: [September 18, 2024 11 a.m.](#) via Canvas

This assignment is to help you get ready for future assignments. You are required to submit your report as a PDF file on [Rice Canvas](#).

1 Python Machine Learning Stack (Anaconda)

You will use Python in this course. In order to prepare for future assignments and the final project, you will be asked to install Python and its useful packages via Anaconda. Anaconda is a high performance distribution of Python and R and includes over 100 of the most popular Python, R and Scala packages for data science. More information on Anaconda can be found [here](#).

Follow these instructions [Installing Anaconda](#) to install Anaconda. Make sure you confirm that Anaconda is installed and working by opening a terminal window and running the command

```
>> conda list
```

If Anaconda is installed and working, this will display a list of installed packages and their versions.

You can also confirm that Anaconda is installed and working by opening a terminal window and running the command

```
>> python
```

to run the Python shell. If Anaconda is installed and working, the version information it displays when it starts up will include "Continuum Analytics, Inc.". Use the command

```
>> quit()
```

to exit the Python shell.

Read this [Cheat sheet](#) to learn how to use the "conda" command.

Task 1: In your terminal, run

```
>> conda info
```

and paste the result into your report.

2 Interactive Terminal (IPython/Jupyter)

IPython/Jupyter is an interactive computational environment in which you can combine code execution, rich text, mathematics, plots, and rich media.

Follow this [IPython Tutorial](#) and [Jupyter Documentation](#) to get up and running on IPython/Jupyter. For more on IPython/Jupyter, check out this great [Gallery of Jupyter Notebooks](#).

3 Transition from MATLAB to Python

MATLAB is a great language, especially for signal processing research and applications. However, in the world of data science, Python is a better choice in terms of memory efficiency and speed. The good news is that transitioning from MATLAB to Python is easy. Read the following tutorial [Numpy for MATLAB Users](#).

In order to run Python in OS X and Linux, open your terminal and type

```
>> python
```

For Window users, please follow this instruction [Running Python in Windows](#).

In order to run the commands in [Numpy for MATLAB Users](#), make sure you import `numpy` and `scipy.linalg` as follow.

```
import numpy as np
import scipy.linalg
```

Task 2: Run all of Python commands in the table "Linear Algebra Equivalents" in [Numpy for MATLAB Users](#). You are required to do this task in

IPython and paste the results into your report.

Task (Optional): Go through [Stanford Numpy Tutorial](#) for additional Numpy exercises.

4 Plotting (Matplotlib/PyPlot)

Matplotlib is the main plotting library for Python and is capable of very powerful publication-quality graphics. Check out this [Matplotlib Gallery](#) if you would like to learn more about plotting using Matplotlib.

Pyplot is a library within Matplotlib that is there to ease the transition from MATLAB to Python. It has a collection of MATLAB-like functions that makes plotting in Python as easy as in MATLAB. Please read through the following [Pyplot Tutorial](#).

Task 3: Run the following script in IPython and paste the figure created by the script into your report.

```
import matplotlib.pyplot as plt
plt.plot([1,2,3,4], [1,2,7,14])
plt.axis([0, 6, 0, 20])
plt.show()
```

Task 4: Use Matplotlib to create a figure of your choice in IPython. Paste your code and figure into your report.

5 Version Control System (BitBucket/GitHub)

When you are working on a big project with your team, managing the changes in your code will be challenging. Version control systems (VCS) like Git help streamline this process. Read [this article](#) on why VCS is necessary. Bitbucket and Github are two commonly used web-based hosting services for projects that use Git version control systems. In this course, you can use either Bitbucket or GitHub.

For Bitbucket user: Please apply for a free Bitbucket account [here](#). Then go through these [tutorials](#) to get up and running on Bitbucket. You can skip the Mercurial tutorial because we will not use it.

For GitHub user: Please register for a student account [here](#) for free private repository access for future projects and go through these [tutorials](#).

Task 5: Paste your VCS account into your report.

6 Integrated Development Environment (PyCharm)

Coding and debugging will be much easier with a powerful IDE. PyCharm is among IDEs of choice for Python. The professional version of PyCharm is free for students. Apply for a free PyCharm license [here](#), then follow the instructions [Pycharm Download and Installation](#) to download and install PyCharm.

Watch these [PyCharm Tutorials](#) to get started. The last three tutorials will show you how to set up and use VCS in PyCharm. Checkout [PyCharm Debugging](#) for a nice PyCharm debugging tutorial.

Task 6: Start a new project in Pycharm. Commit and push your project to Bitbucket/GitHub as a public project. Paste the link of your project in your report.

Submission Instructions

Every student must submit their work in PDF format, providing intermediate and final results as well as any necessary code. Submit your homework on Canvas.

Collaboration Policy

Collaboration both inside and outside class is encouraged. You may talk to other students for general ideas and concepts, but individual write-ups must be done independently.

Plagiarism

Plagiarism of any form will not be tolerated. You are expected to credit all sources explicitly.