

WSU CISER Workshop:

Python Installation and Introduction

This document provides some instructions and links for installing Python and getting started with Jupyter Notebooks, which we will be using for the interactive materials in this workshop. If you already have a Python setup you are happy with, then you don't need to read any further. The second page provides links to two cloud services that can also be used to run the notebooks for the class if you don't want to install anything on your computer. You can read more about how jupyter notebooks interact with the python ecosystem [here](#) and [this guide](#) also provides a nice starting point and overview.

If this feels like too much to handle alone don't worry - we will go through it all together during the workshop ☺

1 Downloading Workshop Notebooks

- The Jupyter Notebooks and resources for this workshop are available at: https://github.com/drdeford/CISER_GerryChain
- To download them to your computer click the green 'Code' button on the GitHub page and then click the 'Download ZIP' button at the bottom of the tab that opens.
- Place the folder somewhere convenient to access and extract the .zip folder

2 Installing Python

- You can install Python together with Anaconda from anaconda.com - the main page should have a download link for a graphical installer for your operating system. Otherwise you can select Products and then Anaconda Distribution at the top of the page and scroll down to 'Anaconda Installers' to select the appropriate link. I recommend simply accepting all the defaults during installation.
- You can also see a step by step guide for your operating system by going to <https://docs.anaconda.com/anaconda/install/> (feel free to skip the recommended step #2)
- [Normally the next step would be to have you create a new environment for the workshop but the current version of Python is a little unstable on Windows, so I've removed those directions for now. [This solution](#) appears to work if you see an error about CondaSSL in any of the steps below.]
- To launch the Jupyter Notebook interface, start by opening up a terminal. On Mac this is your regular terminal opened with Command + T. On Windows, Anaconda installs a new 'anaconda prompt' that you can search for in the start menu.
- You should see the word (base) in parentheses to the left of your path and cursor. Something like:

```
(base) C:\Users\drdef>
```

- Then, launch a jupyter notebook in your browser by typing the following in the command line (and then hitting enter):

```
(base) C:\Users\drdef> jupyter notebook
```

- This will open up a tab in your browser of choice where you can navigate through your file system to the jupyter notebooks you downloaded from GitHub in the previous step for the workshop.
- Clicking on a .ipynb file will open the notebook in a new tab and you should be ready to go! ☺

3 Notebooks in the cloud

If you are unable to install python on your computer, you can still run python programs and notebooks in the cloud using services provided by CoCalc or CoLab. Having Python installed on your computer means that you won't be reliant on internet access to be able to run programs and that you won't need to worry about space limits or computation time limits that the service providers place on the free accounts but particularly if you are just starting out running the notebooks in the cloud can be a convenient starting point.

- <https://cocalc.com> provides a notebook interface that you can access without even making an account. Start by clicking the 'Try' button in the top right. Then you can click the blue 'Use CoCalc Anonymously' button to get started. Then select projects and give the project a title like Networks Intro on the next page before hitting 'Create Project.' Once you hit the blue 'Start Project' button at the top of the page you can upload the Jupyter Notebooks to run them in the cloud. you do register for an account you will be able to save your notebooks in the cloud instead of needing to start over from scratch every time.
- <https://colab.research.google.com> is a Google hosted option that is also free as long as you have a google/gmail account. No need to select a kernel here (they are all python) you can just click file and then new to get started. One advantage to colab for this material is that you can directly import the notebooks from GitHub. If you click File → Open Notebook there is a tab at the top of the interface labelled GitHub where you can enter:

`https://github.com/drdeford/CISER_GerryChain`

which will show you a list of the notebooks for today's session to start working with.

4 Notebooks for the tutorial

The following is a brief description of the main notebooks we will be using to explore the basic features of the networkx package.

- **0_Jupyter_Basics.ipynb** This notebook walks through the basic usage of Jupyter notebooks and how to interact with Python cells. It also includes examples of basic arithmetic, variable assignment, data types, data structures, and imports work in Python as well as a couple of exercises to check your understanding. If you already have some familiarity with Python, this one is safe to skip ☺
- **1_Dual_Graphs_and_MAUP.ipynb** This notebook explores the basic properties of dual graphs (using the networkx package) for representing geospatial data (using geopandas) for redistricting. We will also use the MAUP package to move demographic and partisan data between different levels of resolution and assign census units to plans.
- **2_Compactness.ipynb** In this notebook we will examine continuous and discrete geographic measures on districting plans.
- **3_Partisan_Symmetry.ipynb** In this notebook we use the Partition object from the GerryChain package to analyze the partisan symmetry of redistricting plans.
- **4_Ensembles.ipynb** In this final notebook we will put everything together, using tree-based MCMC methods to generate ensembles of redistricting plans.
- Additional example notebooks for common network analysis tasks can be found here: <https://github.com/drdeford/CISER2023NetworkX>, the repository for another CISER workshop on Computational Tools for Complex Networks. These notebooks have more expository material as the ones for this tutorial session and include plenty of detailed computations.
- If you are interested in trying out the GerryChain package for analyzing districting plans, you can find tutorial notebooks and sample data here: <https://github.com/drdeford/GerryChain-Templates> along with additional documentation and examples here: <https://tinyurl.com/gerrytalk>.