

# PROGRAMMING WITH PYTHON



**BUILD YOUR SKILLS**  
WORKSHOP SERIES

[GO.GWU.EDU/LIBWORKSHOPS](https://go.gwu.edu/libworkshops)

# Today's Instructor

- Dan Kerchner

[kerchner@gwu.edu](mailto:kerchner@gwu.edu)

Materials: [go.gwu.edu/pyw](https://go.gwu.edu/pyw)

# Workshop series

Today 1/29

1–3:45pm

Basic Python  
Language Concepts

Wednesday 1/31

10am–12pm

Data Analysis with  
Pandas

# About today...

- Ask questions!
- If you're stuck:
  - Ask
  - Help each other out!
- If something is confusing in the workshop, it probably needs improvement; let us know.
- Stay as long as you like

# Objectives

- Gain familiarity with one environment for using Python (Google Colab), and awareness of others
- Learn Python language basics
- Load in a data set as a Pandas DataFrame
- Explore and transform ("wrangle") the DataFrame
- Create data visualizations
- Learn how to look things up, how to interpret errors
- Gain confidence to try things we didn't learn today!

# Why Python?



- Free
- General purpose
- Easy to learn
- Readable\*
- Community–developed / Open Source
- Widely used and documented
- Good built–in and contributed libraries

# Different ways to use Python



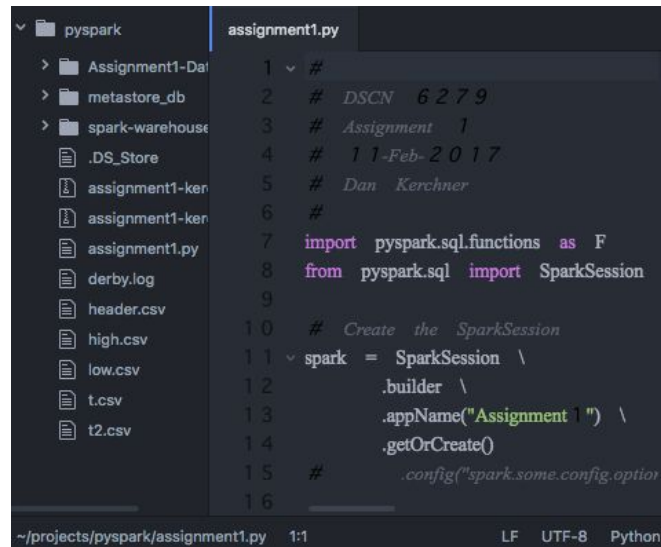
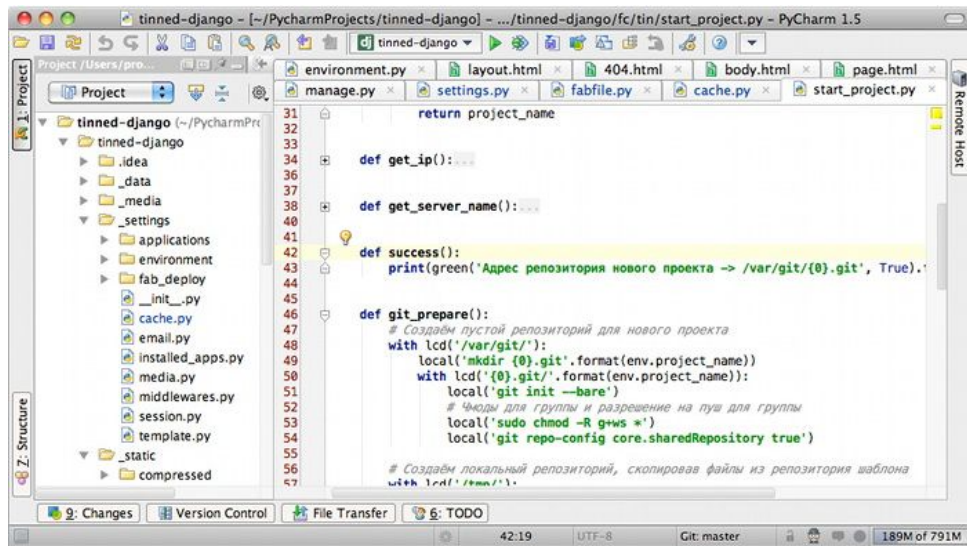
- Command line/REPL

```
Last login: Mon Mar 20 22:09:33 on ttys001
[GLSS-M17LFFT:~ kerchner$ python
Python 2.7.10 (default, Oct 23 2015, 19:19:21)
[GCC 4.2.1 Compatible Apple LLVM 7.0.0 (clang-700.0.59.5)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
[>>>
[>>> opinion = "This workshop is awful!"
[>>> opinion == True
False
>>> █
```

(or <https://replit.com/> )

# Different ways to use Python

- Integrated Development Environment (IDE) – [pyCharm](#), [Spyder](#), ...
- File editor (e.g. Sublime, vim) with Python plug-in





# Different ways to use Python (continued)

- "Notebooks":

- [Jupyter](#) notebooks

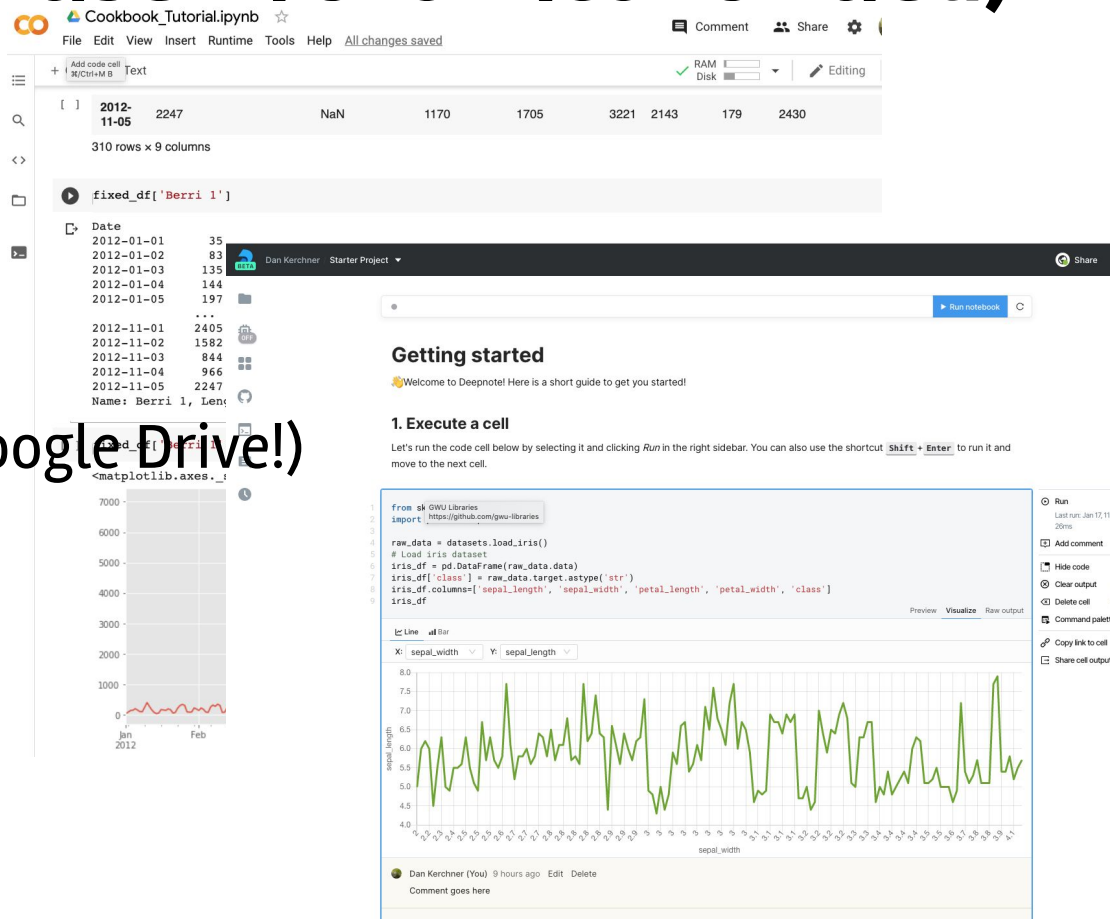
- [Google Colab](#)

(available in your Google Drive!)

- [Kaggle](#) notebooks

- [Deepnote](#)

- [Binder](#)



# Even more ways to use Python

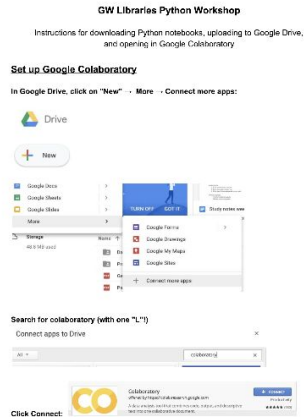
Anaconda = Python (and R) plus:

- **Jupyter notebooks**
- lots of libraries
  - data processing
  - analytics
  - scientific computing
  - including: **Pandas**

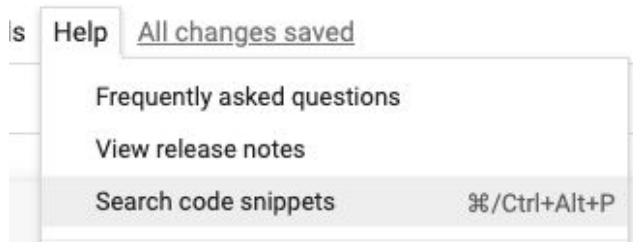


# Setup

- Google Colaboratory  
[colab.research.google.com](https://colab.research.google.com)



# Uploading Data (and doing other things) in Google Colab



Use "Code Snippets" (searchable!) →



Code snippets

upload

Open files from your local file system

Saving data to Google Drive

Saving data with gsutil

Saving data with the Cloud Storage Python API

Open files from your local file system

files.upload returns a dictionary of the files which is keyed by the file name, the value is the data which


```
from google.colab import files

uploaded = files.upload()

for fn in uploaded.keys():
    print('User uploaded file "{name}"
          name=fn, length=len(uploaded[fn
```

VIEW SOURCE NOTEBOOK

# Some recommendations

- Write assuming your code will be read (incl. by Future You)
- Version your code  **GitHub**
- Learn to be "Pythonic" in your style
- Isolate your projects from each other – use venv
- Stuck? Try an Internet search
- Which version of Python are you using?
- Find good code examples and make them work
- Keep learning!

# Some Python libraries/frameworks

|  |   |
|--|---|
| Building web applications  | Django<br>Flask   |
| Scientific/numerical   | Numpy<br>Scipy<br>Pandas  |
| Machine Learning   | scikit-learn, tensorflow  |
| Data Visualization<br>(check out<br><a href="http://www.python-graph-gallery.com">www.python-graph-gallery.com</a> ) | matplotlib<br>bokeh<br>ggplot (like ggplot2 in R)<br>plotly (<- interactive)<br>seaborn |

# Things we learned today in Python that most coding languages also share

- variables
- different data types: numeric, text, logical, etc.
- data structures for holding more than a single value: lists/arrays/matrices/etc.
- loops
- conditional logic (if/then)
- functions
- libraries/packages for bringing in extra functionality

# To Learn More

- PyFlo [pyflo.net](http://pyflo.net) ← NEW!
- Kaggle: [kaggle.com/learn](http://kaggle.com/learn)
- [learnpython.org](http://learnpython.org)
- [Software Carpentry](http://SoftwareCarpentry.org), [Data Carpentry](http://DataCarpentry.org) (not just Python)
- [docs.python.org/3/tutorial](http://docs.python.org/3/tutorial) (and [docs.python.org/](http://docs.python.org/))
- [GW Online: Get data off the ground with Python](http://GWOnline.org)
- [Upcoming Python workshops @ GW Libraries](http://UpcomingPythonworkshops.org)
- LinkedIn learning [it.gwu.edu/linkedin-learning](http://it.gwu.edu/linkedin-learning) courses
  - 253 Python, 6 Pandas
- More on Pandas:
  - Pandas cookbook: [github.com/jvns/pandas-cookbook](http://github.com/jvns/pandas-cookbook)
  - [pandas.pydata.org/pandas-docs/stable/10min.html](http://pandas.pydata.org/pandas-docs/stable/10min.html)
  - [pandas.pydata.org/pandas-docs/stable/tutorials.html](http://pandas.pydata.org/pandas-docs/stable/tutorials.html)
  - [pandas.pydata.org/pandas-docs/stable/cookbook.html](http://pandas.pydata.org/pandas-docs/stable/cookbook.html)
  - [www.datacarpentry.org/python-ecology-lesson/](http://www.datacarpentry.org/python-ecology-lesson/)



# Contact us:

## Coding Consultations (with Dan & colleagues):

[go.gwu.edu/coding](https://go.gwu.edu/coding) – Python, R, HTML/CSS/JavaScript

## Stats Appointments (with Stats grad students):

[go.gwu.edu/dataconsulting](https://go.gwu.edu/dataconsulting)

Workshop Materials: [go.gwu.edu/pyw](https://go.gwu.edu/pyw)  
[kerchner@gwu.edu](mailto:kerchner@gwu.edu)