Intro to Data Management with Python

Course Description: “Data Management with Python, a ***Primer***” is for users who are brand new to using Python and want to get exposure to Python OR existing Python users who want to check out the coursework’s data management methods. This class will cover; introductory Python concepts/methods, basic module usage, debugging tips, Juypter notebooks, Pandas data fames, and more.

Date: June 25th, 2020

Contents

[Intro to Python – Course Section 2](#_Toc43377372)

[What & Why 2](#_Toc43377373)

[Creating a Python script from scratch & the Print Statement 3](#_Toc43377374)

[IDE 3](#_Toc43377375)

[python Versions 4](#_Toc43377376)

[Exercise 1: Hello World! 5](#_Toc43377377)

Instructors/Teaching Assistants

Nathan Zimpher nathan\_zimpfer@fws.gov, MB,

Erin Butts erin\_butts@fws.gov, SA/Fisheries, Portland, OR

Brent Frakes brent\_frakes@fws.gov – Refuges I&M – Fort Collins, CO

Matt Heller matthew\_heller@fws.gov – SA - Bozeman, MT

Setup: Create a C:\TEMP folder

Class Format and Materials

* Attendees, please use the chat box early and often.  Instructors will do their best to answer questions.
* The class will consist of instruction, 5 short hands on exercises and a final challenge
* Materials
  + Sections 1 and 2 attendee reference: HandsOnPythonClass\_June25\_2020\_StudentReference.docx
  + Jupyter notebook files
    - jupyter\_notebooks/PANDAS TRAINING SOLUTIONS.ipynb
    - jupyter\_notebooks/PANDAS TRAINING.ipynb
  + Exercise Results for Sections 1 and 2: Exercise\_Results/(various files)
  + Powerpoint file: additional\_resources/HandsOnPythonClass\_June25\_2020.pptx
  + Additional Python resources: additional\_resources/Addtional Resources.docx
  + Pandas cheat sheet: additional\_resources/Pandas\_Cheat\_Sheet.pdf
  + Jupyter cheat sheet: additional\_resources/weidadeyue\_jupyter-notebook.bw.pdf

Class Outline

* Intro to Python (15 min)
  + Exercises 1A, 1B
* Python Topics for Data Management using IDLE (35 min)
  + Exercise 2A, 2B, 2D Extra Credit
* Python Topics for Data Management using Jupyter (40 min)
  + Final Challenge Exercise

# Intro to Python – Course Section

## What & Why

What is Python - python.org definition:

“Python is an easy to learn, powerful language... (with) high-level data structures and a simple but effective approach to object-oriented programming. Python’s elegant syntax and dynamic typing...make it an ideal language for scripting...in many areas and on most platforms.” *ESRI*

What is Python & Why use it

Free, cross-platform, easy to learn,

Widely useful, great community ESRI

Personal Reason Why…

Interoperable

USFWS and DOI allow using it

Allows me (shareable to ) to do powerful processing

A ton of help resources

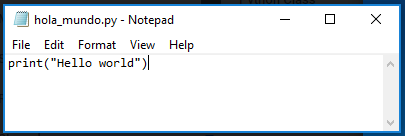
Personal Why not…

GUI development (however there are companion frameworks that can be added e.g. Tkinter, Django)

Code with multiple modules (especially ArcPY) can at times be difficult to transfer to other systems

## Creating a Python script from scratch & the Print Statement

* Creating from scratch easy,
  + Python file is a text file with a .py extension
  + Can also copy/paste old python files



* Print Statement
  + Python statement to enter text in the shell (command line window to execute python)
  + Useful for providing information while the script runs

## IDE

* An integrated development environment (IDE) is a software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consists of at least a source code editor, build automation tools and a debugger…
* The boundary between an IDE and other parts of the broader software development environment is not well-defined; sometimes a version control system or various tools to simplify the construction of a graphical user interface (GUI) are integrated… *https://en.wikipedia.org/wiki/Integrated\_development\_environment*

Why use IDE’s

* Easier code editing (longer scripts, expanding/contracting code, code navigation, editing tools, text colors, etc.,)
* Debugging (various tools)

Common Python IDE’s

* IDLE -  bundled with the default install of Python, Shell window, Editor Window, Debug Control Window
* MS Visual Studio – my favorite!!!!
* PyScripter
* PyCharm
* Many many more…

Jupyter Notebooks (discussed in depth later in this)

* Non-traditional IDE
* Visualization capabilities (graphs, tables, etc.)
* Sharing

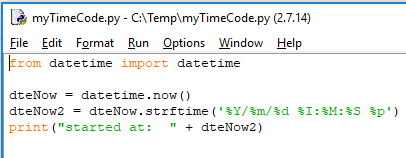
## python Versions

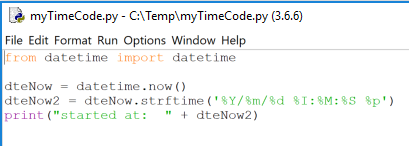
2x vs 3x

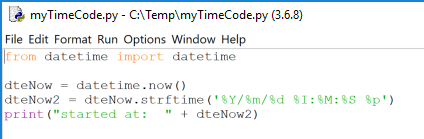
* Syntax
* ArcGIS Desktop vs ArcGIS Pro
* IDLE startup .bat file path examples
  + 2x
    - C:\Python27\ArcGIS10.6\Lib\idlelib\idle.bat
    - C:\Python27\ArcGIS10.6\Lib\idlelib\idle.bat
    - C:\Program Files\MySQL\MySQL Shell 8.0\lib\Python2.7\Lib\idlelib\idle.bat
    - C:\Microsoft\AndroidNDK\android-ndk-r16b\prebuilt\windows\lib\python2.7\idlelib\idle.bat
    - C:\Program Files\MySQL\MySQL Shell 8.0\lib\Python2.7\Lib\idlelib\idle.bat
    - C:\Microsoft\AndroidNDK64\android-ndk-r16b\prebuilt\windows-x86\_64\lib\python2.7\idlelib\idle.bat
  + 3x
    - C:\Program Files (x86)\Microsoft Visual Studio\Shared\Python36\_64\Lib\idlelib\idle.bat
    - C:\Program Files (x86)\Microsoft Visual Studio\2019\Community\Common7\IDE\Extensions\Microsoft\Python\Miniconda\Miniconda3-x64\Lib\idlelib\idle.bat
    - C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3\Lib\idlelib\idle.bat
    - C:\Users\fwsManaged\AppData\Local\Programs\Python\Python37\Lib\idlelib\idle.bat

**Feel free to find the idle.bat file on your system during this presentation!!!!**

IDE considerations – make sure the IDE is configured with the Python version you want





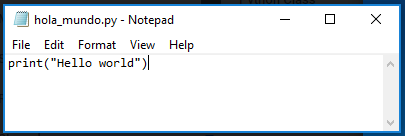


## Exercise 1: Hello World!

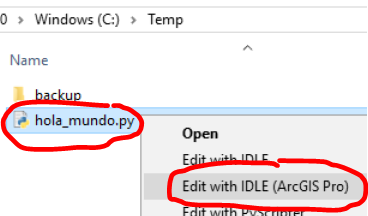
Introductory Python concepts/ methods

* What is Python & Why use Python
* Creating a Python Script from Scratch
* The Print Statement

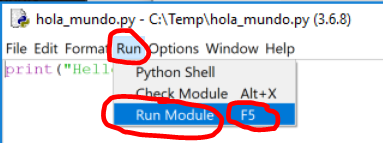
1. Open a text editor (e.g. MS Notepad)
2. Enter print(“Hello world”) 🡪 save as filename hola\_mundo.py on C:\temp



1. In a file browser, right click 🡪 hola\_mundo.py 🡪 select “Edit with IDLE…”



1. Note: explore intellisense functionality. Enter the text “pr” 🡪 ctrl-spacebar 🡪 tab
2. Under the Run menu, click Run Module OR click the F5 shortcut key



1. Rerun from step 3 however select “Edit with IDLE”, do you notice a difference?

