

# Using Python to Solve Problems by Creating Custom Tools



Jake Krebs and Kember Martin

# Purpose

The purpose of this presentation is to introduce basic Python functionality in ArcMap. This presentation will provide an example approach to learning and familiarizing yourself with Python that any non-programmer can take. We will also discuss how to begin incorporating Python into your day-to-day GIS workflows by creating custom tools.

# Outline

- Learning Python
- Creating a Script
  - Defining the Problem
  - Planning the Script
  - Writing the Script
  - Updating and Maintaining the Script
- Python in Everyday Use

# Learning Python

- Code Academy
  - [www.codecademy.com](http://www.codecademy.com)
  - Free resource
  - 13 hour Python Course
  - No previous programming knowledge required

# Learning Python

codecademy

Learn to code interactively, for free.



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Python

Last active about 1 month ago



# Learning Python

- Free Python Classes

- ESRI

- [esri.com/training](http://esri.com/training)

- Google

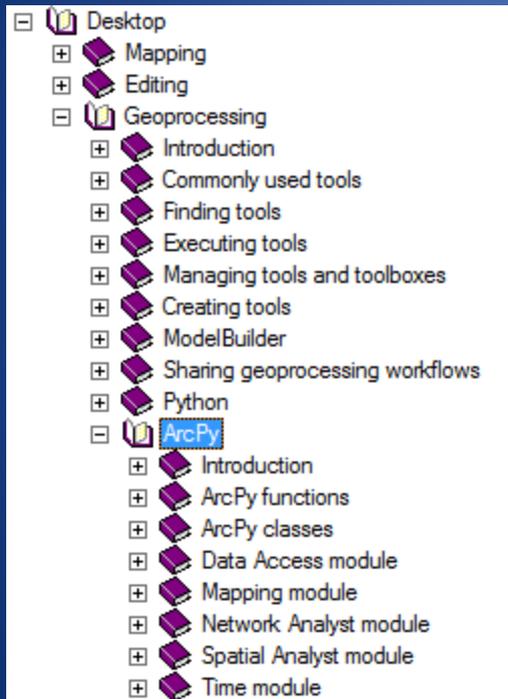
- [developers.google.com/edu/python](http://developers.google.com/edu/python)

# Learning Python

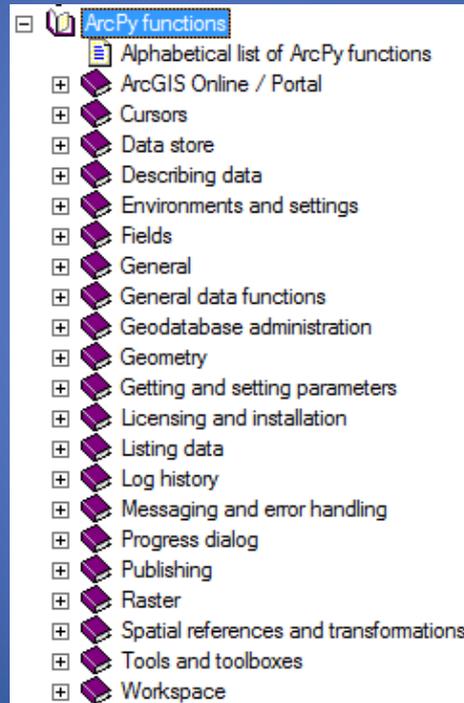
- ArcPy
  - ArcMap's Python Module
  - First line: `import arcpy`
  - ArcPy functions and classes
    - Cursors
      - Search
      - Update
      - Insert
  - ArcGIS Desktop Help

# Learning Python

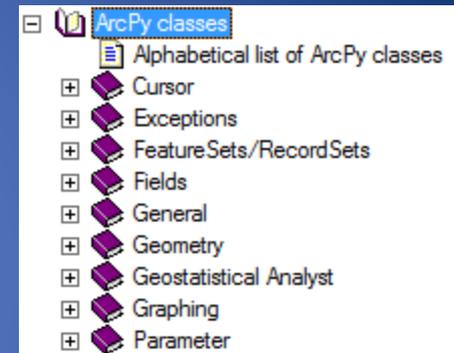
## Desktop Help



## ArcPy Functions



## ArcPy Classes



It's usually best to specifically search for what you need.  
The Desktop Help is there if you don't quite understand a concept.

# Learning Python

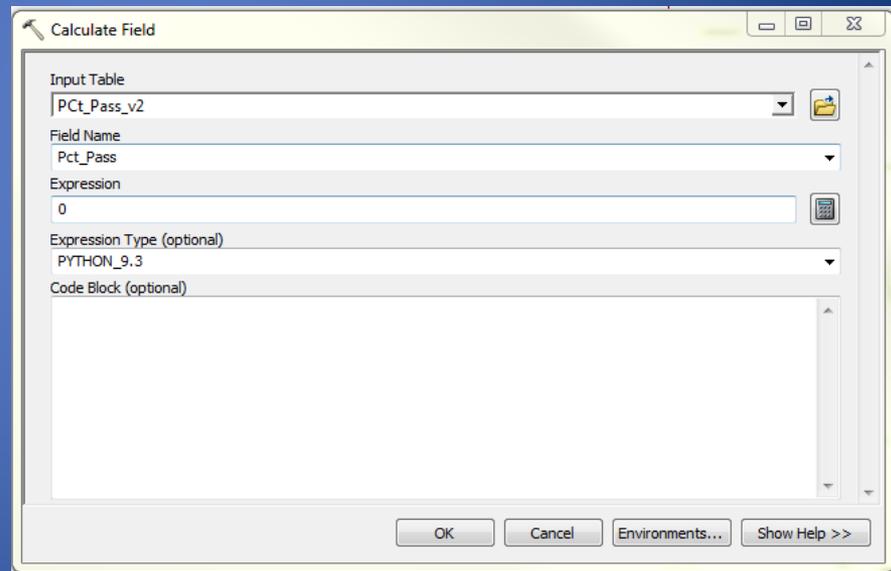
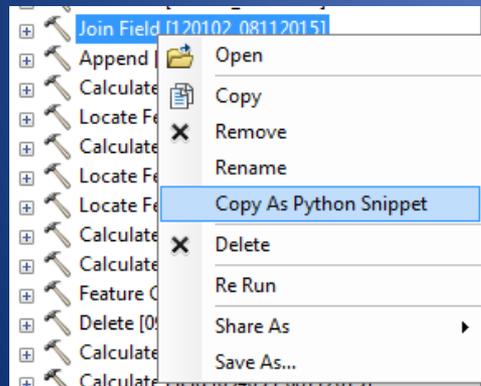
- Forums
  - [gis.stackexchange.com](https://gis.stackexchange.com)
  - [geonet.esri.com](https://geonet.esri.com)

# Learning Python

- Practice!
  - Recreate old workflows
  - Try Python first
  - Create games

# Learning Python

- A Calculate Field dialog box filled out and what the corresponding code for the same process looks like.



```
import arcpy

arcpy.CalculateField_management(in_table="Pct_Pass_v2", field="Pct_Pass", expression="0",
                               expression_type="PYTHON_9.3", code_block="")
```

# Creating a Tool

- Define the Problem
  - No way of accurately mapping data using reference post and offset
- Understand Potential Challenges
  - Complicated Road Network
    - Travel Over Routes
    - Distance breaks
  - Data needs updated regularly

# Creating a Tool

- Plan the Workflow
  - Brainstorm
  - Research
  - Test
  - Write an Outline

# Creating a Tool

- Writing the Code
  - Tips
    - Work on one section at a time
    - Check for efficiency as you go
    - Add comments as you go
  - Error Handling

# Creating a Tool

- Updating and Maintaining the Tool
  - Making Improvements
  - Updating Data
  - Reusing Code for Other Projects

# Python in Everyday Use

- Automating Simple Tasks
- Editing Tables in ArcMap vs. Excel
- Writing Scripts for Model Builder

# Demonstration

- Editing a table in IDLE (Python GUI)
  - Write code directly into the interpreter
  - Create a new .py or .txt file
  - Does not require ArcMap or any layers to be open (data cannot have a user lock)

# Demonstration

- Editing a table in ArcMap's Python Window
  - Allows you to plug layers into tools via interactive listing
  - Provides interactive help in a column next to your code

# Demonstration

- Incorporating scripts into ArcMap
  - Turning a script into a tool
  - Adding your custom tool to Model Builder

# Questions?

