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# Python for ArcGIS - Writing Scripts to Manipulate GIS Data

## Overview

Python is becoming more and more popular for writing custom scripts in ArcGIS. Python scripts can be used to manipulate a map, execute geoprocessing commands, and read/write files. This three-day course takes a leveled approach to writing scripts; beginning with basic Python syntax and simple scripts, ending with scripts that read files, manipulate the information, and create GIS data.

## Audience

This course is for those who are already comfortable with the basics of ArcGIS and want to learn how to write Python scripts to manipulate data and maps.

## Topics Covered

### Day 1

- Introduction to Python – Learn about the Python scripting language, why it is useful, and begin with the basic building blocks of a script (What is Python?; Writing Python Scripts; Python Syntax)
- Variables – Getting input from the user, storing that information in containers, and converting between different data types (Variable Declarations; Strings and Numbers; Help and Resources)
- Object Oriented Scripting – Writing scripts that look at data and make decisions based on the properties it discovers (Objects, Properties, and Methods; Decision Making)
- Modules and ArcPy – Accessing general, and ArcGIS-specific, functionality in Python (Modules; ArcPy Site Package; ArcPy Methods; arcpy.env)

### Day 2

- Geoprocessing with Python – Accessing ArcGIS geoprocessing tools, licenses, and extensions in Python (ArcToolbox; Calling Tools in Python; Licenses and Extensions; Error Handling)
- Lists and Loops – Reading through lists of information, such as all of the layers in a map document or all of the feature classes in a geodatabase (Lists; Loops; List Methods)
- Map Documents – Manipulating the contents, layer properties, and other aspects of a map document with Python (The Big 3 Objects; Table of Contents; Data Driven Pages)
- Data Access with Cursors – Accessing, modifying, or updating the data within a table using Python (Tuples; Search Cursors; Update Cursors; Insert Cursors)

### Day 3

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- Working with Geometry – Understanding how shapes are stored for GIS data and how that information is handled in Python (Understanding Geometry; Python Objects for Geometry; Accessing Geometry)
  - Custom Tools – Advanced Python techniques in the Field Calculator and creating custom ArcToolbox tools from Python scripts (Custom Function Definitions; Script Arguments; Script Tools; ModelBuilder)
  - File Input and Output – Work with directories and paths to read and write files, such as creating log files (Working with Directories and Paths; Reading and Writing Files; File Tips and Tricks)

## Format

In-person instruction with hands-on practice, and course materials you can keep.

## Prerequisites and Recommendations

Attendees should have knowledge of Microsoft Windows® and be familiar with the basic use of ArcGIS, including the topics covered in both the **Fundamentals of ArcGIS** and **Intermediate GIS Concepts** classes, as well as the **Python Primer – Writing Your First Script** class.