

Python for ArcGIS Pro – Writing Scripts to Manipulate GIS Data

Course Length: 3 days

ArcGIS Version: Pro 3.x

App: ArcGIS Pro

Overview

This three-day course teaches you to write Python scripts that automate geoprocessing workflows, manipulate ArcGIS Pro projects and maps, and read and write GIS data directly from code. The course takes a leveled approach, starting with the fundamentals of Python syntax and simple scripts before building toward real-world automation tasks: looping through all the feature classes in a geodatabase, updating attribute values with cursors, creating custom script tools that run inside ArcGIS Pro, and writing geometry programmatically. All scripting is done using the arcpy site package inside ArcGIS Notebooks, so participants work in the same environment they will use on the job. By course end, you will have the skills to take repetitive manual workflows and turn them into scripts that run in seconds, consistently, every time. This class is supplemented with a second course, Getting Started with the ArcGIS API for Python and Jupyter Notebooks, which covers the ArcGIS API for Python, Jupyter Notebooks, and interacting with web GIS.

Audience

This course is designed for ArcGIS Pro users who are comfortable with the fundamentals of the software and are ready to extend what they can do through scripting. It is ideal for GIS technicians, analysts, and data managers who want to automate geoprocessing tasks, manipulate project contents, and work with GIS data programmatically. Prior programming experience is not required, but familiarity with ArcGIS Pro at the level covered in Introduction to ArcGIS Pro and Intermediate ArcGIS Pro is expected.

Topics Covered

Day 1

- Introduction to Python – Understand what Python is, why it is the scripting language of choice for ArcGIS, and how to write and run your first scripts inside ArcGIS Notebooks. (Python; Where are Python Scripts Written?; Python Syntax)
- Variables – Make your scripts flexible and reusable by storing user input, file paths, and discovered values in variables that work across different datasets and environments. (Using Variables in Your Scripts; Strings and Numbers; Getting User Input; Help and Resources)
- Object Oriented Scripting – Write scripts that inspect data, evaluate conditions, and make decisions based on what they find, so your code adapts intelligently rather than running the same steps blindly. (Objects, Properties, and Methods; Decision Making)

- Modules and ArcPy – Unlock ArcGIS-specific scripting power through the arcpy site package, and extend your scripts further with Python's built-in and third-party modules. (Modules; ArcPy Site Package; ArcPy Methods; arcpy.env)

Day 2

- Geoprocessing with Python – Call any ArcGIS geoprocessing tool from a script, manage licenses and extensions programmatically, and handle errors gracefully so your scripts fail informatively instead of silently. (ArcGIS Pro Geoprocessing; Calling Tools in Python; Licenses and Extensions; Error Handling)
- Lists and Loops – Process collections of data automatically by looping through all the layers in a map, all the feature classes in a geodatabase, or any other list that arcpy returns, without touching each item manually. (Lists; Loops)
- List Methods – Use arcpy's built-in list functions to retrieve targeted inventories of fields, feature classes, workspaces, maps, and layouts that your scripts can act on. (List Methods)
- ArcGIS Pro Projects – Control the contents of your ArcGIS Pro projects from code: access maps, layers, and layouts as objects and modify their properties programmatically without opening the interface. (The Primary mp Objects; Contents Pane)
- Data Access with Cursors – Read, update, and insert records in attribute tables and feature classes row by row using Python cursors, opening up direct access to the data that drives your GIS. (Cursors; Scheduled Job)

Day 3

- Custom Tools – Package your Python scripts as custom ArcToolbox tools with user-defined inputs, so colleagues can run your automation without ever opening a script file, and integrate those tools into ModelBuilder workflows. (Custom Function Definitions; Script Arguments; Script Tools; ModelBuilder)
- File Input and Output – Write scripts that navigate directory structures, read and write text files, create log files, and traverse geodatabases to find and process data across your file system. (Directories and Paths; Reading and Writing Files; Formatted Print Statements)
- Python Tools for Publishing – Use Python to automate the publishing of GIS content to ArcGIS Pro and web GIS environments, reducing the manual steps involved in sharing and updating services.
- Working with Geometry – Understand how point, line, and polygon geometry is stored in GIS data and how to access, read, and write geometry objects directly in Python for advanced data creation and manipulation. (Understanding Geometry; Python Objects for Geometry; Accessing Geometry)

Format

In-person or online 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 Pro, including the topics covered in both the **ArcGIS Pro Essentials Series Part I** and **Part II** classes.