# GIS Programming Class Notes (Week 2)

## Introduction to Python in ArcGIS Pro

1. Python as an Open-Source Language

- Python is open-source, allowing users to create and sell applications freely.

- Esri integrates Python into ArcGIS Pro for automation and scripting.

- Unlike proprietary software, Python remains widely applicable beyond GIS.

2. Compiled vs. Interpreted Languages

- Python is an interpreted language, meaning it runs without prior compilation.

- Languages like C++ require conversion into binary code before execution.

- Python executes dynamically, making it flexible but requiring thorough testing.

3. Object-Oriented Nature of Python

- Python focuses on objects and interactions instead of a strict event sequence.

- IntelliSense/autocomplete in IDEs reduces typos and improves efficiency.

- Using the same IDE consistently helps recognize syntax errors faster.

## Python Scripting in ArcGIS Pro

4. Project Structure & Feature Class (FC) List

- Example: myprojection.project script.

- The script processes feature classes (FCs) and filters for polygons.

- If shape type = polygon, the script creates a new folder and processes its contents.

5. Scalability of Python Scripts

- Scripts can process any number of input files dynamically.

- Example: A county project renamed 350+ files in seconds.

- Changes are irreversible (no Ctrl + Z), so careful execution is required.

6. Creating Points Along a Line

- Converts polygon data to point-based data at 500-unit intervals.

- Uses comments (#) to explain script functionality.

- Commenting is a debugging technique to isolate problematic lines.

7. Understanding IDE Features for Python Coding

- Color coding differentiates comments, errors, and keywords.

- Green = Comments, Red = Errors, Orange = Keywords.

- Using a consistent IDE setup helps identify syntax issues quickly.

## Python vs. Esri’s Arcade Language

8. Python as the Primary ArcGIS Pro Scripting Language

- Python is not designed exclusively for Esri software but is widely supported.

- Arcade is Esri’s proprietary language, optimized for map styling and data visualization.

9. Why Esri is Developing Arcade

- Arcade is more compatible with Esri tools and simplifies some GIS tasks.

- Python scripts may encounter compatibility issues with Esri updates.

- Future versions of ArcGIS Pro may gradually transition toward Arcade.

10. Converting Between Scripting Languages

- ArcGIS Pro allows users to convert Python scripts to Arcade or Visual Basic (VB).

- This feature can assist when transitioning between languages or troubleshooting functions.

- Example: If uncertain about a Python function, write it in Arcade and convert it to Python.

11. Using Model Builder for GIS Automation

- Model Builder provides a visual workflow for designing geoprocessing tasks.

- Can be used to structure loops and conditional statements before converting to Python.

- Example: A project required extracting specific data subsets, but writing the script directly in Python was challenging. Model Builder helped visualize the looping logic, which was later converted to Python for final implementation.

12. Arcade’s Future in ArcGIS Pro

- Currently, Arcade is limited, but is expected to become more powerful over time.

- Since Arcade is only a few years old, Esri will likely expand its capabilities for broader use.

- Some users prefer Python’s versatility, while others may adopt Arcade for Esri-specific projects.

## Esri’s Software Evolution & Business Strategy

13. Transitioning from Legacy Software

- Esri has historically phased out older programs, despite initial claims of continued support.

- Running two parallel systems is inefficient, so companies eventually phase out older technology.

- Example: Early ArcMap users resisted ArcGIS Pro, but updates eventually made ArcGIS Pro the standard.

14. Microsoft’s History of Business Practices

- In 1995, Microsoft Windows 95 automatically removed Netscape during installation.

- Netscape was the leading web browser, similar to Firefox today.

- Microsoft’s response: "We didn’t know it did that," despite antitrust concerns.

- Lesson: Proprietary software can dominate markets by controlling compatibility.

15. WordPerfect vs. Microsoft Word (Historical Case Study)

- WordPerfect & Lotus 1-2-3 were the leading office programs.

- Microsoft’s proprietary Windows coding caused crashes in competitors.

- Businesses switched to Microsoft Word & Excel for stability over quality.

## Course Announcements & Assignment Expectations

16. Assignments & Weekly Structure

- Class materials will be available at least two weeks in advance.

- Assignment deadlines: Usually due by midnight on the due date.

- If you miss submission, reach out for guidance.

17. Virtual Class & Office Hours

- Thursday’s class will be virtual (no live recording planned).

- Instructor will be online during class time for questions & assistance.

- Sunday office hours available via virtual meeting code.