

Syllabus—GEOG 9021

GIS Programming with Python

Spring 2022 Friday and Saturday, April 15th - April 16th, 8:30 am – 5:30 pm - Online Virtual Format

Description

Programming methods allow the GIScience professional to accomplish two main goals: (1) automating repetitive tasks, and (2) extending the capabilities of the GIS and remote sensing tools to perform analyses that are not possible using the software tools provided. Much introductory GIScience work involves interacting with the data to create maps and simple analyses; GIScience professionals quickly discover that they need to use logic and automation to complete more advanced analyses, or even mundane repetitive tasks. Class Format: Approximately 50% lecture, 50% exercises.

Instructor

Dara O'Beirne

darao@sfsu.edu

Resources

- Installation instructions for ArcGIS Pro:
<https://gis.sfsu.edu/arcgis-pro-installation-instructions>

Course Objectives

Introduce Python for ArcGIS to conduct efficient geoprocessing analysis:

- Introduction to the syntax of the Python programming language.
- Understand the introductory and basic concepts of Python programming for GIS.
- How to use ArcPy, the Python programming library for the ArcGIS Desktop suite.

We will use Esri's ArcGIS Pro (Version 2.8.0) but will be focusing on the Python aspects of geoprocessing within the software package.

Grading

This course is graded Credit/Non-Credit. To receive a Credit grade, students must demonstrate completion of each section by turning in assignments.

All forum participation must be finished, and assignments must be submitted by 10pm Sunday, April 17th, 2022.

Recommended Reading:

Recommended - Zandbergen, P (2020). Python Scripting for ArcGIS Pro. ESRI Press

Recommended - Zandbergen, P (2020). Advanced Python Scripting for ArcGIS Pro. ESRI Press

Optional - Toms S, O'Beirne D (2017). ArcPy and ArcGIS, 2nd edition. Packt Publishing

Course Sections

Lecture(s)	Lab Exercise(s)	Suggested Completion Date
Introduction to the Python Language <ul style="list-style-type: none">• variables, lists, numbers, strings, computations, conversion• modules• control flow structures: if, while, for, def	Exercise 1	April 15th, 2022
Introduction to Python in ArcGIS <ul style="list-style-type: none">• Intro ArcPy• Conda• Python window vs IDE• ArcPy list methods	Exercise 2	April 15th, 2022
Geoprocessing Tools in Scripts <ul style="list-style-type: none">• Syntax of geoprocessing tools• ArcPy documentation• Debugging• Describe• Exists• Messages• Data management tools	Exercise 3	April 15th, 2022
Cursors for Processing Records <ul style="list-style-type: none">• Cursors: Search, Insert, Update	Exercise 4	April 16th, 2022
Script Tools <ul style="list-style-type: none">• Intro to script tools in ArcGIS Pro	Exercise 5	April 16th, 2022
Pandas Python Data Processing <ul style="list-style-type: none">• Intro to popular data processing library in python called Pandas	Exercise 6	April 16th, 2022
Introduction to ArcGIS API for Python <ul style="list-style-type: none">• Using Python for Web GIS	Exercise 7	April 16th, 2022

GIS Licensing Policy

San Francisco State University has excellent educational discounts for ArcGIS software and we are fortunate to be able to provide our students with the installation and licensing files needed to install the software up on a home computer.

Please remember that when you use ArcGIS Online or install ArcGIS software on your computer, you are agreeing to only use the software only for your own teaching and learning purposes. You should not use or permit others to use ESRI education products for consulting or any other form of commercial or profit-generating activities with your license. Please review our full site license agreement in the link below for a more comprehensive understanding of this policy.

[ESRI ArcGIS Permitted Uses](#)

(<https://sfsu.box.com/s/7i3319kej7f8qlxuhnnbk0pxuw959s6q>)

SF State Policies

Disclosures of Sexual Violence (Title IX)

SF State fosters a campus free of sexual violence including sexual harassment, domestic violence, dating violence, stalking, and/or any form of sex or gender discrimination. If you disclose a personal experience as an SF State student, the course instructor is required to notify the Dean of Students. To disclose any such violence confidentially, contact:

- The SAFE Place – (415) 338-2208; psyservs.sfsu.edu/content/safe-place
- Counseling and Psychological Services Center – (415) 338- 2208; psyservs.sfsu.edu

Disability Access

Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the reasonable accommodations process. The DPRC is in the Student Service Building and can be reached by telephone (voice/TTY 415-338-2472) or by email to dprc@sfsu.edu.