

GEOG 5180/6180: Geoprocessing with Python

Fall 2019, Units: 3

Prerequisites: GEOG 1180 (i.e. basic GIS and programming experience).

Instructor: Tom Cova cova@geog.utah.edu
Office: GC 4730
Phone: 801-581-7930
Office Hrs: Mon 1:30-3:00, Tue. 1-3 pm (or by appointment)

When/where: Th. 4:35 pm – 7:35 pm, GC 1825 (Gardner Commons)

Text Zandbergen, P. (2013) *Python Scripting for ArcGIS*. ESRI Press.
Optional: An introductory general-purpose Python book (there are many).

Course scope and objectives

This course is an introduction to programming in the Python language as it pertains primarily to manipulating and analyzing geographic information. Broadly the course will cover: 1) principles and good practice in computer programming, 2) the Python language, 3) manipulating and analyzing geographic information with Python, 4) scripting with Python in ArcGIS, and 5) Python toolkits for the web, databases, and Graphical User Interfaces (GUIs). The lab and lecture are one and the same, and each week will consist of a presentation of concepts and background followed by a lab involving hands-on programming or scripting. The last third of the course will consist of individual programming projects.

Upon completion of this course, students will be able to:

1. *Recall* the fundamental definitions and principles to program in Python.
2. *Understand* the inner workings of Python programs for geoprocessing.
3. *Develop* and *code* new algorithms for geoprocessing in the Python language.
4. *Develop* and *code* Python scripts for geoprocessing in ArcGIS.
5. *Utilize* Python to access a host of libraries for the web, databases, etc.

Grading: Ten assignments (50%), project proposal (5%), final project (20%) and presentation (5%), in-class exercises and participation (20%).

Course policies and information:

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services (CDS), 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.

Projects: The last few weeks will be dedicated to GIS & Python projects. Students will be responsible for defining a geographic problem or question, gathering and integrating the data, writing a Python Script or general-purpose program, and presenting the results. A slide presentation of the project (PPT) is due **prior to your scheduled presentation time**, and the **Python code and data are due December 12th**, 5:00 pm (ZIP works best). **Project proposals are due on Thursday, October 3rd** and should include the follow sections: Name, Project Title, Objectives or Questions, Data sources, Methods (e.g. Python with a brief description of any algorithmic steps), Expected results/products, Time frame, and References).

Course outline

Week	Date	Title	Readings/Lab
1	8/22	Introduction to Geoprocessing with Python	Lecture only <i>Assign. 1: Code academy Syntax through Functions</i>
2	8/29	Introducing Python Geoprocessing in ArcGIS	Chapters 1-2 <i>Assign 2: Exercise 3</i>
3	9/5	Lists, Dictionaries, and Loops	<i>Assign 3: Code academy Lists/Diction. and Loops</i>
4	9/12	Learning Python language fundamentals Geoprocessing using Python (on-line week)	Chapters 4-5 <i>Assign. 4: Exercises 6</i>
5	9/19	Manipulating spatial data Working with geometries	<i>Chapters 7-8 Assign. 5: Exercise 9</i>
6	9/26	Map scripting Debugging and error handling	<i>Chapters 10-11 Assign: 6: Exercise 12</i>
7	10/3	Creating custom tools Sharing tools	<i>Chapter 13-14 Assign 7: ESRI course</i>
	10/10	Fall Break	
8	10/17	General purpose spatial data programming: Computational geometry Project proposals due (see instructions)	<i>Assign 8: Minimum bounding rectangles</i>
9	10/24	General-purpose spatial data programming: Euclidean and network analysis	<i>Assign 9: Flying vs. driving distances</i>
10	10/31	General-purpose spatial data programming: Raster elevation, slope, and aspect	<i>Assign 10: Terrain analysis</i>
11	11/7	Python packages: an overview	<i>Project time</i>
12	11/14	Guest Lecture	<i>Project time</i>
13	11/21	Project advising and support	<i>Project time</i>
14	11/28	Project advising and support	<i>Project time</i>
15	12/5	Project Presentations	<i>PPT due before lecture; code due 12/12 by 5 pm</i>

Safety & Wellness

The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677) this number will get you to a dispatch officer at the University of Utah Department of Public Safety (DPS; dps.utah.edu). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.

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Your well-being is key to your personal safety. If you are in crisis, call 801-587-3000; help is close.

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