

GEOG 489 Programming for GIS

Spring 2022

Jinwoo Park, Ph.D.

Who is the instructor?

Jinwoo Park, Ph.D.

- Current position
 - Postdoctoral research associate,
Department of Geography and GIS,
University of Illinois at Urbana-Champaign
- Education
 - 2021, Ph.D., Department of Geography, Texas A&M University
 - 2016, M.S., Department of Geography, Kyung Hee University, South Korea
 - 2013, B.S., Department of Geography, Kyung Hee University, South Korea



Course overview

- Highlights
 - Programming principles in Python
 - Spatial analysis (vector, raster) with open-source package
 - Geospatial data visualization (static, dynamic)
 - Customizing scripts for advanced functions and tools
- Requirements
 - 8 labs, 2 exams, and 1 team-project

Learning objectives

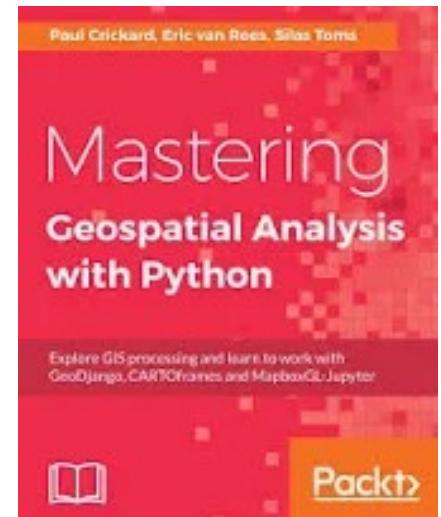
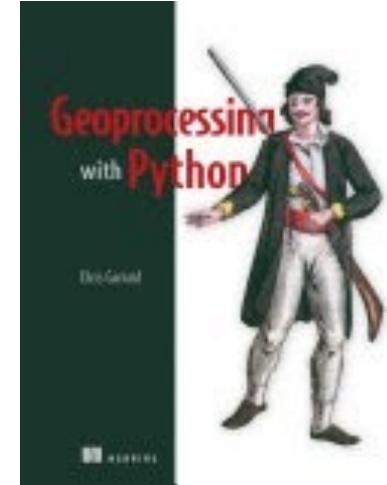
- Learn the basics of programming using Python and CyberGISX.
- Programmatically access GIS data and use these data in GIS modeling, computation, visualization, and analysis.
- Conceptualize, design, plan, implement, and document a custom GIS programming solution to a real-world problem.

Course structure

- First half (before spring break)
 - Fundamentals of Python and basic spatial analysis
 - Tuesday: lecture, Thursday: lab
- Second half (after spring break)
 - Apply Python to spatial analysis and reproduce scientific research
 - Tuesday: lecture, Thursday: hands-on workshop

Textbooks (recommended)

- Garrard. (2016). *Geoprocessing With Python* (1st edition). Manning Publications. ISBN 1-61729-214-1
- Toms, van Rees, E., & Crickard, P. (2018). *Mastering Geospatial Analysis with Python* (1st edition). Packt Publishing. ISBN 1-78829-333-9



Access textbook through library

The screenshot shows two views of the Illinois Library website. The left view is a mobile or tablet version, and the right view is a desktop version. Both views feature the Illinois Library logo and a search bar. The desktop view shows search results for 'geoprocessing with python'.

Left View (Mobile/Desktop):

- Search for: Everything, Books, Articles, Journals, Media
- Easy Search: Enter search terms, Multi-Subject Resources, SEARCH
- Suggestions: Need additional assistance? Ask a Librarian
- Articles - 71 Results
- 1: Development of Gridded Reference Graphics Using Machine Learning and a Customized Geoprocessing Workflow
- 2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS, Geoscience and Remote Sensing Symposium IGARSS, 2021 IEEE Xplore Digital Library, Conference

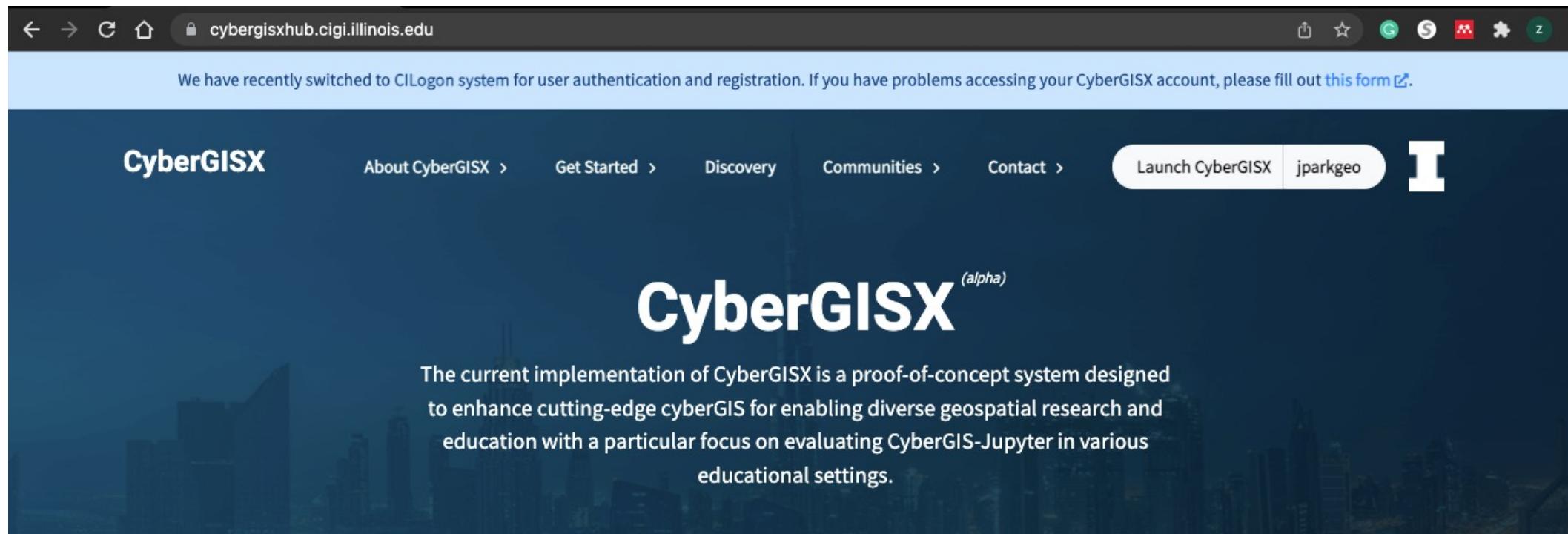
Right View (Desktop):

- Search for: Keywords, geoprocessing with python, GO
- Suggestions: Need additional assistance? Ask a Librarian
- Search Classic Easy Search
- Library Catalog - 21 Results
- 1: Geoprocessing With Python Available Online Garrard, Chris Author Manning Publications 2016
- 2: Programming ArcGIS with python cookbook : over 85 hands-on recipes to teach you how to automate your ArcGIS for desktop geoprocessing tasks using python

<https://guides.library.illinois.edu/ebook/providers#s-lg-box-23682143>

Computational resources

- CyberGISX Platform (<https://cybergisxhub.cigi.illinois.edu/>)
 - Jupyter Notebook with Python



Grading

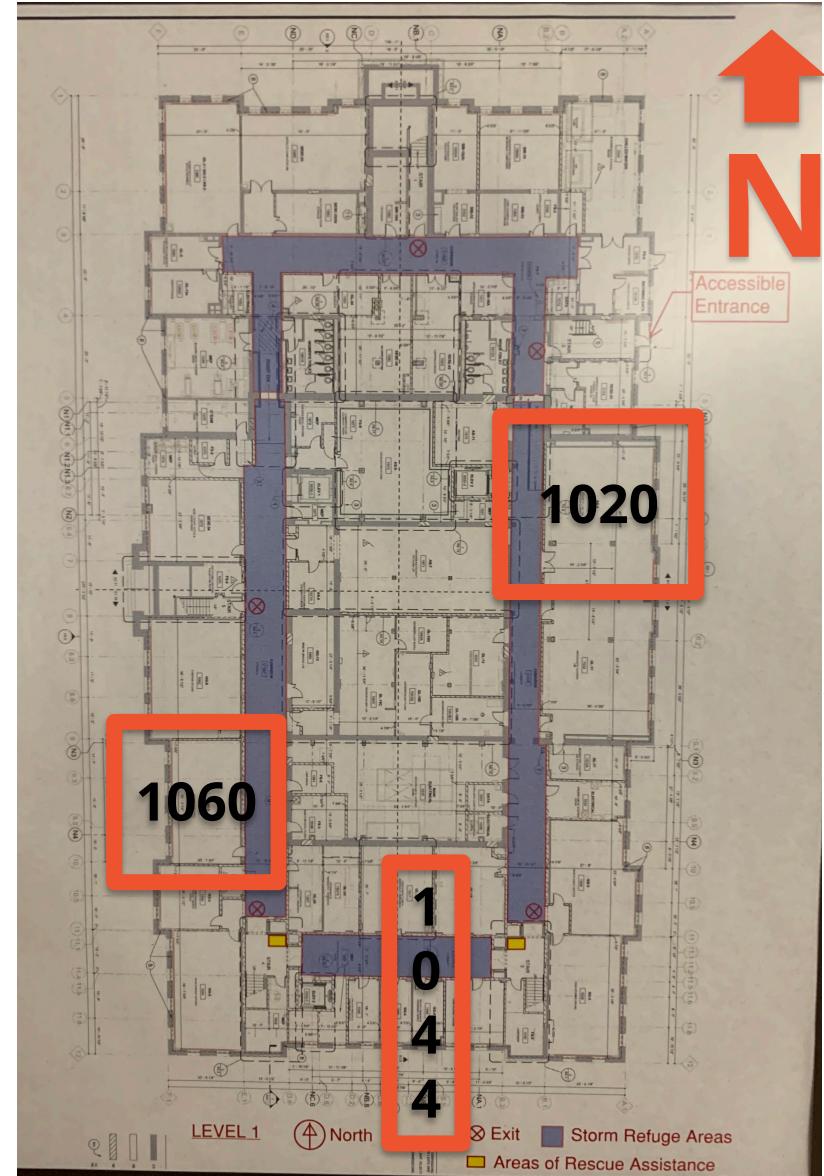
- Class participation (10%): 2 absences are allowed
- Labs (40%)
 - 5 points * 8 labs
- Research project (25%)
 - 10 points from the instructor
 - 10 points from classmates (inter-team review)
 - 5 points from teammates (intra-team review)
- Exams (25%)
 - Midterm(15 points)
 - Final (10 points)



A	93.33% -100.0%
A-	90.00% -93.32%
B+	86.67% -89.99%
B	83.33% -86.66%
B-	80.00% -83.32%
C+	76.67% -79.99%
C	73.33% -76.66%
C-	70.00% -73.32%
D+	66.67% -69.99%
D	60.00% -66.66%
F	60%

Important space and time

- Classroom
 - 2:00 – 3:20 PM Tuesday and Thursday
 - Room 1020, Natural History Building
- Office hour
 - 3:30 PM - 4:30 PM, Tuesday and Thursday
 - Room 1044, Natural History Building
- Instructor office
 - Room 1060, Natural History Building



Communication protocol

- Please send email to the instructor (jparkgeo@illinois.edu) or leave your question to Q&A Forum at learn.illinois.edu
- Instructor will attempt to response to emails within 24 hours during the weekdays.
- BUT do not expect an immediate response and plan accordingly.

Course schedule

Weeks	Lecture Topics	Reading	Projects	Lab
Week 1	Course orientation Introduction to Python environment	Geoprocessing ~ Chapter1		Y*
Week 2	Python basics	Geoprocessing ~ Chapter 2		
Week 3	Aspatial data manipulation		Project Proposal Pitch	Y
Week 4	Spatial data manipulation: Vector	Mastering ~ Chapter 4 & 5.	Project Team Matching	Y
Week 5	Spatial data manipulation: Raster	Geoprocessing ~ Chapter 9 & 10		Y
Week 6	Geospatial data visualization	Geoprocessing ~ Chapter 13		Y
Week 7	Basic spatial analysis with Python			Y
Week 8	Review session & Proposal Presentation (Mar 8 th) Midterm (Mar 10 th , 2 pm – 3:20 pm)			

Course schedule (cont.)

Weeks	Lecture Topics	Reading	Projects	Lab
Week 9	Setting up a collaboration environment Data acquisition with Python			
Week 10	Advanced spatial analysis: Network analysis and accessibility measurements	To be announced		Y
Week 11	Advanced spatial analysis: Spatial optimization	To be announced	Status report	Y
Week 12	Spatial statistics with Python: Correlation, regression, and spatial autocorrelation	To be announced		Y
Week 13	Spatial statistics with Python: spatial data uncertainty	To be announced		
Week 14	Final presentations (Apr 26 th and 28 th)			
Week 15	Review session (May 3 rd) Project product submission due (May 4 th , midnight; before May 5 th)			
Week 16	Final exam (May 11 th , 7 pm – 10 pm)			

Class repository

Learn.illinois.edu

The screenshot shows the Learn@Illinois dashboard. On the left, there's a sidebar with 'Dashboard' selected, 'My courses', 'Timeline', and 'Calendar' sections. The main area has a 'Course Request' section with a 'Request a Course Site' button, a 'Course Search' section with a search bar, and a 'Course overview' section with dropdown menus for filtering by course name and view type.

Github.com/jparkgeo/GEOG489

The screenshot shows the GitHub repository page for 'jparkgeo / GEOG489'. The repository is public and has 6 commits. The 'Code' tab is selected, showing files like '.DS_Store', '.gitignore', 'GEOG489_Syllabus_Park.pdf', 'LICENSE', and 'README.md'. The 'About' section includes a description 'UIUC Programming for GIS', a 'Readme' link, and stats: 0 stars, 1 watching, and 0 forks. The 'Releases' section shows 'No releases published' and a 'Create a new release' button. The 'Packages' section shows 'No packages published'.

Next class

- Why you need to study GIS Programming?
- Introduction to Python environment
- Setting up environment (Lab 0)
 - CyberGISX Platform
 - Jupyter Notebook
 - Github
- Reading (recommended)
 - Geoprocessing with Python, Chapter 1

Q&A

Jinwoo Park
jparkgeo@illinois.edu

Please introduce yourself (extra 1 point)

- Your Name & Year & Department
- Reason to take this course
- Your expectation to the course; what you would like to learn
- Familiarity to Python (newbie, beginner, intermediate, advanced)