

Econ 5740 GIS Data & Mapping for Sustainable Development & Social Justice

Summer 2019 Syllabus

Course Resource page - <http://darrylmcleod.com/gis/>

*Class meets May 28th to June 27th 6-9pm 115 Dealy near Starbucks &
video linked FCLC Room to be announced*

Instructor

Professor Darryl McLeod (mcleod@fordham.edu)

Guest Speakers

Emmanuel Letouzé, Data-Pop Alliance

Marcelo La Fleur, UN DESA

Stephanie Swinehart, IPED 2019

Alfredo Cuecuecha,

Rosendo Ramirez, Universidad de Lima + representatives from the University Neighborhood Housing Program (UNHP) Northwest Bronx Resource Center and the New Economy Project both community organizations which map New York City housing violations and advocate for affordable housing) Speake

Teaching Assistants

Meshri Etolba, Economics RH

Himanshu Malik, GSB, LC

Rosendo Ramirez, Lima Peru

I. COURSE DESCRIPTION

Synopsis: This course introduces students to displaying data using Python, R, QMS, Stata, Matlab, Eviews and SAS. Students choose a dataset and write an online tutorial use one of these programs to open access data. Tutorials that can be replicated by instructors will be posted on the CIPS web page.

GPS identified data sets: what is it good for?

The GPS data can be used to locate clinics or aid centers, direct immigrants out of harm's way even as spatial econometrics quantifies neighborhood or "spillover" effects as in Chetty et al 2016 return to the famous Moving to Opportunity (MTO) studies. Students who take this course will master one spatial data set and program (preferably "open source"). Students also learn basic spatial econometrics to test well-known findings such as the relationship between foreign aid, transfers and poverty.

Recent US and UK elections remind us that geographical data and software can be used inform and mislead. This course introduces students (graduate students or seniors with permission) to Python, R, Stata or Eviews and an available data set to analyze data visually (typically GIS or AI routines). Each student produces an online tutorial (see these examples posted by Elitza Mileva and Meshry Etolba). Particular focus of this course is the Health Survey GPS data for household. see Mileva, Elitza. "Using Arellano-Bond dynamic panel GMM estimators in Stata." Economics Department, Fordham University 64 (2007): 1-10. Elitza's example prepared for a 2007 Summer course has been cited over

As Minnesota Population Center (IPUMS) cautions use public data set for good (never for evil). This is our goal. Location-based data sets can be misused, targeting users using personal information to manipulate elections and fuel conflict. That said scholarly and social justice promoting uses are possible as well. We draw inspiration (and examples) from [Raj Chetty's Econ 1152 course](#), *Using [Big Data to solve Economic and Social Problems](#)* (revisiting MTO outcomes in the Bronx and Queens). Even small GPS data sets can be used to good use, as with the Arizona Humanitarian Organization "No more Deaths" uses water supply coordinate monitor, resupply groups and show migrants where to find relief bottled water in the Sinaloa desert ([Boyce et al 2019](#))^[1]. Similarly, the IOM-UNCHR use GIS Apps to guide refugees safely Africa and Europe. GIS data can also inform lifesaving health intervention outcomes: e.g. how distance to a clinic affect maternal and child mortality? Is this problem that can be dealt with by better roads or motor bikes (or drones?) Spatial econometrics helps quantify the extent to which distance and agglomeration matters for reducing inequality and poverty. A major step forward in this sense are GPS coordinates for survey households (random errors are used to protect privacy, but if you act through the UN or a University U.S. AID will check your results using actual locations, try it).

[1] Boyce, Geoffrey Alan, Samuel N. Chambers, and Sarah Launius (2019) "Bodily Inertia and the Weaponization of the Sonoran Desert in US Boundary Enforcement: [A GIS Modeling of Migration Routes through Arizona's Altar Valley.](#)" Journal on Migration and Human Security 2331502419825610.

II. GIS Packages and Software available for use in this course

Before you install these packages send us and email (mcleod@fordham.edu) or ask us in class

QGIS Open source GIS software...

- [Tutorial](#) (NY City Neighborhoods)
- [Download and Install](#)
- [InfoShare](#)

ArcGIS-is available in Keating computer lab. You can get a one year license by enrolling in the [UC Davis Coursera course](#) CIPS can cover the cost of the course (\$50) but you may need a desktop computer so using the computer lab make more sense initially.

Stata - [How to create Maps with Stata](#) (Fordham has Stata 13)

EvIEWS - [New EvIEWS 11 features](#)

Matlab - [Mapping Toolbox](#)

R and RStudio: Download [R](#) then download [Rstudio](#). You will use Rstudio to access R. The best general online sources for R are: Start with this [YouTube](#) playlist then go on to [R for Data Science](#). For GIS and Spatial Econometric check out [Geocomputation with R](#).

Python: The best way to download python is to download the [anaconda](#) distribution. Make sure to install the anaconda with Python 3.7 version or latter and the anaconda with Python 2.7 version. Python 2.7 is depreciated. Once you download anaconda, open the anaconda navigator in from your start menu and use either Spaydr or Jupyter Notebook to access python. The best basic intro to python is this [YouTube](#) playlist. Once you go through that, then check out Learning [Python for Social Scientists](#) and/or [Data Analysis in Python](#).

General GIS Data Resources

1. MIT geospatial [library](#)
2. Harvard [Center for Geographic Analysis](#) [Newsletter](#) Geospatial [library](#)
3. Tufts GIS [Tutorials](#)
4. GIS [Training Manual for Historians](#)
5. Environmental Systems Research Institute (ESRI) ArcGIS [tutorials](#)
6. [GIS Programming and Automation](#) (Open Access Online Class, PennState)
7. Python Scripting for ArcGIS

GIS Economic Development Applications

1. Melissa Dell, MIT Economics Department, 2009 [GIS Analysis for Applied Economists](#)
2. Kudamatsu's Course: [ArcGIS 10 for Economics Research](#)
3. CIESIN [Thematic Guide to Night-time Light Remote Sensing and its](#) Applications
4. Raj Chetty's Stanford Univ [Big Data & Social Problems](#) Course now Harvard Intro Econ

Using GIS Data in Stata

1. Spatial Data Analysis in Stata
2. Stata in space: Econometric analysis of spatially explicit raster data

Analyzing GIS Data in R

For a full list of R spatial packages see the [Analysis of Spatial Data](#) library

Common R packages for GIS include:

1. [sp](#) (the basis of spatial functionality in R)
2. [rgdal](#) (for loading spatial file formats such as shapefiles)
3. [rgeos](#) (for spatial analysis)
4. Basic GIS in R [tutorials](#) Advanced GIS in R [tutorials](#)

III. Introductory Texts and References

A Gentle Introduction to Stata (ISBN: 978-1-59718-142-6)

Hands-On Intermediate Econometrics Using R (ISBN: 981-4350-41-9)

- An Introduction to R for Spatial Analysis and Mapping (Chris Brunsdon, Lex Comber)
- Advanced R, Second Edition (Hadley Wickham, Chapman & Hall/CRC)
- Applied Spatial Data Analysis with R (Roger S. Bivand, Edzer Pebesma, Virgilio Gómez-Rubio)
- R for Data Science: Import, Tidy, Transform, Visualize, and Model Data (Hadley Wickham, Garrett Grolemund)
- Displaying Time Series, Spatial, and Space-Time Data with R (Perpinan Lamigueiro, Oscar)
- Data Visualization: A Practical Introduction (Kieran Healy)
- Fundamentals of Data Visualization: A Primer on Making (Claus O. Wilke)
- Spatio-Temporal Statistics with R (Christopher K. Wikle, Andrew Zammit-Mangion, Noel Cressie)

IV. Economics Research and papers using GIS or Satellite images

1. Chen, X and W D Nordhaus (2011) "Using luminosity data as a proxy for economic statistics", Proceedings of the National Academy of Sciences.
2. Elvidge, C D, K E Baugh, E A Kihn, H W Kroehl and E R Davis (1997) "Mapping city lights with night-time data from the DMSP operational linescan system", Photogrammetric Engineering & Remote Sensing, 63(6): 727-734.
3. Feenstra, R C, R Inklaar and M P Timmer (2015) "The next generation of the Penn World Table", American Economic Review, 105(10): 3150-3182.
4. Henderson, J. V., A. Storeygard and D. Weil (2012) "Measuring Growth from Outer Space", American Economic Review, 102(2), pp.994-1028.
5. Pinkovskiy, M. (2013) "Economic Discontinuities at Borders: Evidence from Satellite Data on Lights at Night", Working Paper.
6. Pinkovskiy, M L and X Sala-i-Martin (2016a) "Lights, camera, ... income! Illuminating the national accounts-household surveys debate" Quarterly Journal of Econ, 131(2): 579-631.

7. Pinkovskiy, M L and X Sala-i-Martin (2016b) “Newer need not be better: Evaluating the Penn World Tables and the World Development Indicators using night-time lights”, NBER, Working Paper no 22216.
8. Harttgen, K., Klasen, S., & Vollmer, S. (2013). [An African growth miracle? Or: what do asset indices tell us about trends in economic performance?](#). *Review of Income and Wealth*, 59(S1), S37-S61.
9. Young, Alwyn. “[The African Growth Miracle.](#)” *Journal of Political Economy* 120.4 (2012): 696-739.
10. Andy Schmitz, 2012, [Geographic Information System Basics](#), v1 Creative Com ([homepage](#))
11. Gibson, J., & McKenzie, D. (2007). [Using global positioning systems](#) in household surveys for better economics and better policy. *The World Bank Research Observer*, 22(2), 217-241.
12. Travelling the Distance: [A GPS-Based Study of the Access to Birth Registration](#) Services in Latin America and the Caribbean

V. Other Resources

1. <https://allaroundgis.wordpress.com/>
2. http://siteresources.worldbank.org/DEC/Resources/USING_THE_GLOBAL_POSITIONING_SYSTEM_GPS_IN_HOUSEHOLD_SURVEYS.pdf
3. <http://2012books.lardbucket.org/books/geographic-information-system-basics/index.html>
4. https://scholar.google.com/scholar?cluster=8466076583400530056&hl=en&as_sdt=5,33&scioldt=0,33&as_ylo=2019
5. Data Pop Alliance Emmanuel Letouzé (Co-Founder and Director)
6. <http://datapopalliance.org/about/vision-and-members-2/>