

# **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 27<sup>th</sup> 6-9pm 115 Dealy near Starbucks &  
video linked FCLC Room to be announced

## **Instructor**

Professor Darryl McLeod (mcleod@fordham.edu)

## **Guest Speakers TBA not confirmed**

Marcelo La Fleur, UN DESA

Stephanie Swinehart, IPED 2019

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)

\*Emmanuel Letouzé, Data-Pop Alliance (MIT & Harvard)

## **Teaching Assistants**

\*Himanshu Malik, GBS

Rosendo Ramirez, University of Lima

Meshri Etolba, GSAS Economics

*\*Thanks to Himanshu Malik & Meshri Etolba for helping put together this Syllabus.*

## **I. COURSE DESCRIPTION (preliminary)**

*Location identified data: what is it good for?*

As Minnesota Population Center (IPUMS) cautions use public data set for good (never for evil). Indeed we know data linked to persons or locations can be used to mislead and misinform, even to create fake demonstrations and protest groups. That said location based data can also be used to reduce inequality and promote social Justice. These applications are the focus of this course. We explore how the UN and other NGOs have used location based data to better target and monitor the Sustainable Development Goals. For example the Humanitarian organization “No more Deaths” uses GPS data to guide resupply groups and to show migrants where to find relief from searing heat<sup>[1]</sup>. Along these same lines UN agencies IOM-UNCHR developed apps to guide refugees through Africa and Europe to the locations of groups and agencies most likely provide them with shelter and assistance. In the tradition of

Chetty's course [Using Big Data to solve Economic and Social Problems](#) this course focuses on location and development inside and outside the U.S. [Chetty models several Bronx neighborhoods and local Universities, great examples for this course..]

Geographical data mapping software is increasingly applied in a variety of contexts. This has no prerequisites but exposes graduate students (or Seniors with permission) use a range of available computer languages and software including Python, R, Stata, Matlab and/or Eviews. Students use readily available data to prepare a online (and in class) demonstration of how to use that software. These tutorials reflect student interests and available data and become online tutorial. Sometimes these step by step tutorials take off and are widely cited. A great example Fordham Economics PhD students Stata GMM how to guide for example has been cited over a 188 times ([see google citations](#), "Using Arellano-Bond dynamic panel GMM estimators in Stata." Economics Department, Fordham University 64 (2007): 1-10. Citation Mileva, Elitza. "[Using Arellano-Bond dynamic panel GMM estimators in Stata.](#)" Economics Department, Fordham University 64 (2007): 1-10 (congratulations Elitza Mileva... )

Though the connections are less direct, GIS can also inform lifesaving interventions throughout the developing world (and even in New York). How does lack of access (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 us quantify the extent to which distance and agglomeration matters for reducing inequality and poverty. A major step forward is the release of GPS coordinates for surveyed 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).

The GPS tracking can be used to locate aid centers, direct otherwise vulnerable immigrants out of harms way and inform our understanding to ubiquitous neighborhood and "spillover" effects. Students who take this course will master some corner of various computer code that helps us understand and visualize the "big data" generated by our cell phones (and satellites). Fortunately, there are many examples of data used to promote rather than undermine social justice. From humanitarian groups mapping (to maintain) water stations in the dangerous deserts of the Arizona and the Sahel to IOM-UNCHR apps that guide Syrian refugees through Europe to the cities most likely provide them with legal status. Spatial econometrics helps us quantify well know and ubiquitous.

[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](mailto:mcleod@fordham.edu)) or ask us in class

### *QGIS Open source GIS software...*

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

ArcGIS-is available but only in Keating computer lab. You can sign up for the [Coursera course offered by UC Davis](#) and download a one year trial, CIPS can cover the cost of the course (\$50)

**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

## *Dealing with GIS Data in R*

1. For a list R spatial packages see the [Analysis of Spatial Data](#) library
2. Common R packages for GIS are:
  1. [sp](#) (the basis of spatial functionality in R)
  2. [rgdal](#) (for loading spatial file formats such as shapefiles)
  3. [rgeos](#) (for spatial analysis)
3. Basic GIS in R [tutorials](#)
4. Advanced GIS in R [tutorials](#)

## **III. Required Texts**

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

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

### *Travel Books*

- 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 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](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](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/>

Mileva, Elitza. 2007. "Using Arellano – Bond Dynamic Panel GMM Estimators in Stata." [http://www.fordham.edu/economics/mcleod/Elitz-UsingArellano%E2%80%93Bond GMMEstimators.pdf](http://www.fordham.edu/economics/mcleod/Elitz-UsingArellano%E2%80%93Bond%20GMMEstimators.pdf) (accessed July 9, 2010).

Kudamatsu, Masayuki. "GIS for credible identification strategies in economics research." *CESifo Economic Studies* 64, no. 2 (2018): 327-338. <https://academic.oup.com/cesifo/article/64/2/327/4792976>

Kudamatsu Causal Inference with Spatial Data <https://sites.google.com/site/mkudamatsu/gis>

[https://paper.dropbox.com/doc/Causal-Inference-with-Spatial-Data--Aeb9KBJXsqX\\_EhEKUR1fSaGMAg-cUQJSOGxuuMGCRcEq1Yrp](https://paper.dropbox.com/doc/Causal-Inference-with-Spatial-Data--Aeb9KBJXsqX_EhEKUR1fSaGMAg-cUQJSOGxuuMGCRcEq1Yrp)

Paradata? <https://www.census.gov/newsroom/blogs/research-matters/2017/04/paradata.html>

<https://www.wpbeginner.com/wp-tutorials/how-to-add-ssl-and-https-in-wordpress/>

GIS for empirical research design: An illustration with georeferenced point data

Kogure, Katsuo, and Yoshito Takasaki. "GIS for empirical research design: An illustration with georeferenced point data." *PloS one* 14, no. 3 (2019): e0212316.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0212316>

Can Californians Still Find a Path to Mobility at the State's Universities? Miriam Pawei

<https://www.nytimes.com/2019/05/30/opinion/california-universities.html?action=click&module=Opinion&pgtype=Homepage>

How to move word press from http to https

<https://www.wpbeginner.com/wp-tutorials/how-to-add-ssl-and-https-in-wordpress/>

USING THE GLOBAL POSITIONING SYSTEM (GPS) IN HOUSEHOLD SURVEYS FOR BETTER ECONOMICS AND BETTER POLICY\* John Gibson, University of Waikato David McKenzie, Development Research Group, World Bank June 2007 [http://siteresources.worldbank.org/DEC/Resources/USING\\_THE\\_GLOBAL\\_POSITIONING\\_SYSTEM\\_GPS\\_IN\\_HOUSEHOLD\\_SURVEYS.pdf](http://siteresources.worldbank.org/DEC/Resources/USING_THE_GLOBAL_POSITIONING_SYSTEM_GPS_IN_HOUSEHOLD_SURVEYS.pdf)

<https://sites.google.com/site/mkudamatsu/gis>