

PUBL6343: GIS for the Urban Applications
Spring, 2020
Yuasa, Toshiyuki, Ph.D.
Wednesday 5:30 pm to 8:30 pm
M 104

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Office Hours: by appointment only

Course Description: The purpose of this course is to provide students advanced knowledge in Geographic Information System (GIS) and spatial statistical analysis as tools for public policy decision making. GIS technology has been employed particularly for local governments' policy decision making processes balancing key values such as efficiency, equity, community viability, and environmental quality (O'Looney 2000; Thomas and Humenik-Sappington 2009). We explore various case studies employing GIS analytical tools and replicate some of the analyses.

This course begins with surveying the application of GIS for decision support for public policymaking. Then, the course moves to univariate descriptive and multivariate spatial analysis using *ArcGIS*. The course ends by analyzing various urban issues focusing on the key values in public policy makings with spatial perspectives.

The GIS analytical tools are also employed in the field of the digital humanities. Contrary to the geoscience and the social science, the humanities use GIS as an interpretive tool rather than an embodiment of complete knowledge (Travis 2015, 122). But, the students from humanities need to learn the same GIS analytical techniques for his or her digital humanity research project. So, this course is not limited to the filed of the geoscience or the social sciences.

Textbooks

Require textbook:

Allen, David W. 2016. GIS Tutorial 2: Spatial Analysis Workbook. New York: ESRI Press.

Wang, Fahui. Quantitative Methods and Socio-Economic Applications in GIS. New York: CRC Press.

Weekly readings:

Downloadable from Dropbox or UH MD Anderson library

Grading Scheme

Term paper presentation	10%
Assignments	45%

Term paper 45%

Assignments

There will be several assignments over the course of the semester. Students are using assigned GIS or spatial analytical tool(s) to analyze the assigned data and to provide a written report of their findings. Both assignment documents and datasets are available from our class **Dropbox**. If the data files exceed the upload capacity of the Dropbox, I will upload them to **Box.net**. **The late submission document will not be graded.** If you encounter serious emergencies such as illness during the submission period, submit the proper documentation such as a doctor's note. It is your responsibility to contact me.

Term Paper

Each student can choose his or her research topic relating to his or her area of interest. You will present your research on the last day of the course, **April 22nd**, and submit your final version of your term paper by **April 29th**.

University Policies

Academic Honesty Policy (<http://www.uh.edu/provost/shared-interest/policy-guidelines/honesty-policy/>)

- The consequences of an academic honesty infraction: suspension, expulsion, and a violation notation on their permanent record.

Academic Accommodations for Students with Disability

(<http://www.uh.edu/provost/shared-interest/policy-guidelines/student-disability-accommodation/>)

Students with Disabilities: The College of Liberal Arts and Social Sciences, in accordance with 504/ADA guidelines, is committed to providing reasonable academic accommodations to students who request them. Students seeking accommodation must register with the Center for Students with Disabilities (CSD) 713-743-5400 and present approved documentation to me as soon as possible.

*If you need special accommodation to meet any of the requirements of this course, please contact me by the second class session.

Counseling and Psychological Services: Counseling and Psychological Services (CAPS)--www.uh.edu/caps--are available for students having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS) by calling 713-743-5454 during and after business hours for routine appointments or if you or somebody you know is in crisis. The "Let's Talk" program provides a drop-in consultation service at convenient locations and hours around campus. http://www.uh.edu/caps/outreach/lets_talk.html

Classroom Conduct:

Student Conduct Policy: CLASS students are expected to abide by the University of Houston's Code of Student Conduct: <http://www.uh.edu/dos/behavior-conduct/student-code-of-conduct/>

Policy on Cell Phone and Laptop Use

DO NOT USE your electronic devices for playing with social media sites such as Facebook, Twitter, etc., texting, email, web surfing during the class session. **If you are expecting a work-related emergency message or call, please sit closer to the door and replay the text message or take the call outside of the classroom.** Needless to say, your cell phone or tablet should be either turned off or in manner mode during each class session.

Attendance

If you miss **three class sessions** without my approval, I will take out ten percent (10 points) course grade points from the total (100 points). **Also please avoid being late for a class** since it is very disturbing to the other students. A student being late for class frequently will lose his or her participation points.

Course Schedule

Introduction

Topic

**Data Structure
Compiling data for ArcMAP
Basic Feature of GIS and ArcMap**

Readings

Required

*Steinberg and Steinberg Chapter 1 (Why think spatially?)

Read two of the readings from the following:

O’Looney, John. 2000. Beyond Maps: GIS and Decision Making in Local Government. Redlands: ESRI Press. *Chapter 1-Introduction, Chapter 2-GIS and Decision Making, Chapter 5-Integrating Public Values using GIS Technology, Chapter 6-Using GIS to promote efficiency, Chapter 7-Using GIS to promote equity.*

Greene, R. W. 2000. GIS in Public Policy. Redlands: ESRI Press. *Chapter 1-Education, Chapter 2-Health and Safety, Chapter 4-Environment, Chapter 5-Social Services*

Travis, Charles. 2015. Abstract Machine: Humanities GIS. Redland: Esri Press. Chapter 2 and 3.

Lecture Series 1: GIS for decision support

Topic

GIS Urban Applications

Nyerges, Timothy L., and Piotr Jankowski. 2010. Regional and Urban GIS: A Decision Support Approach. New York: Guilford Press. *Chapter 1 & 2*

Burby, R. J. (2006). "Hurricane Katrina and the Paradoxes of Government Disaster Policy: Bringing About Wise Governmental Decisions for Hazardous Areas." *The Annals of the American Academy of Political and Social Sciences* **604**(1): 171-191.

Giusti de Perez, Rosario C., and Ramon A. Perez. 2008. *Analyzing Urban Poverty: GIS for the Developing World*. Redlands: ESRI Press. *Chapter 1*

Gnapati, Sukumar. 2011. "Uses of Public Participation Geographic Information Systems Applications in E-Government," *Public Administration Review*, May/June: 425-434.

Thomas, Christopher, and Nancy Humenik-Sappington. 2009. *GIS for Decision Support and Public Policy Making*. Redland: ESRI Press. Chapter 1 through 7

Chapter 1: Decision Support for Budget and finance

Chapter 2: Defending a decision/reaching a compromise

Chapter 3: facilitating public participation in decision making

Chapter 4: Making decisions under pressure

Chapter 5: Decision support for allocating resources

Chapter 6: Making decisions on the fly

Chapter 7: Supporting policies with GIS

Case studies

Elena, Fagotto, and Fung Archon. 2006. "Empowered Participation in Urban Governance: The Minneapolis Neighborhood Revitalization Program." *International Journal of Urban and Regional Research* 30 (3):638-55.

Peterson, Anne F., Barbara Sgouraki Kinsey, Hugh Bartling, and Brady Baybeck. 2008. "Bringing the Spatial In: The Case of the 2002 Seattle Monorail Referendum." *Urban Affairs Review* 43 (3):403-29.

Lecture Series 2: Introduction to Spatial Data and ArcGIS exploratory analysis

Topic

GIS Data for Urban Management and Development

Census Data

Color Decision for Maps

**Selecting Color Scheme for Maps*

Consult www.ColorBrewer.org

*ESRI ArcGIS 10.3 Help (<http://resources.arcgis.com/en/help/>)

*ESR ArcGIS tutorial (<http://learn.arcgis.com/en/projects/get-started-with-arcgis-online/>)

Working with Layers

*(http://resources.arcgis.com/en/help/main/10.1/index.html#/Adding_layers_to_a_map/0066000000t000000/)

Mapping where things are

Mapping the most and least

Mapping density

DeMers, Michael N. 2009. GIS for Dummies. New York: John Wiley & Sons. *Part I & Part II*. (You can check out the e-book of this book from UH library)

Maanteay and Ziegler: Chapter 2 Spatial Data and Basic Mapping Concept

Lecture Series 3: Lining Up Data

Coordinate Systems

Coordinate & Projections

Sipes, James L. 2005. "Mapmaking and GIS" *Cadastylst*; Dec2005, Vol. 22 Issue 12, p48-50, 3p

Mitchell, Andy. 1999. The ESRI Guide to GIS Analysis Volume 1: Geographic Patterns & Relationships Redland: ESRI Press. *Chapter 2*

Applications: (Recommended)

MacDonald, Heather. Alan Peters. 2011. Urban Policy and the Census. Redlands: ESRI Press. *Chapter 1*

Johnson, M., W. L. Gorr, et al. (2005). "Location of service facilities for the elderly." *Annals of operation research* **136**(1).

Robert B Kent, and Richard E Klosterman. 2000. GIS and mapping: Pitfalls for planners. American Planning Association. *Journal of the American Planning Association* 66, no. 2, (April 1): 189-198.

Glick, J. (2008). "Gentrification and the Racialized Geography of Home Equity." *Urban Affairs Review* **44**: 280-295.

Hertel, Karen, and Nancy Sprague. 2007. "GIS and census data: tools for library planning." *Library Hi Tech*. Vol.25, No. 2: 246-259

Kent, Robert B., and Richard E. Klosterman. 2000. "GIS and mapping: Pitfalls for Planners." *Journal of the American Planning Association*, Spring 66, 2: 189-198

Lecture Series 4: Spatial Data Construction

Topic

Geodatabases
Geocoding

*ESRI ArcGIS Tutorial Geocoding
(<http://resources.arcgis.com/en/help/main/10.1/index.html#//002500000006000000>)

Applications:
(*Recommended*)

Rushton, G., M. P. Armstrong, et al. (2006). "Geocoding in Cancer Research: A Review." American Journal of Preventive Medicine **30**(2, Supplement 1): S16-S24.

Whitsel, E., P. M. Quibrera, et al. (2006). "Accuracy of commercial geocoding: assessment and implications." Epidemiologic Perspectives & Innovations **3**(1): 8.

Oliver, M. N., K. Matthews, et al. (2005). "Geographic bias related to geocoding in epidemiologic studies." International Journal of Health Geographics **4**(1): 29.

Karimi, H. A., M. Durcik, et al. (2004). "Evaluation of Uncertainties Associated with Geocoding Techniques." Computer-Aided Civil & Infrastructure Engineering **19**(3): 170-185.

Robinson, J., S. Wyatt, et al. (2009). "Methods for Retrospective Geocoding in Population Studies: The Jackson Heart Study." Journal of Urban Health **87**(1): 136-150.

Lecture Series 5: Data Analysis I

Finding what's inside
Finding what's nearby

Mapping change

*Allen, David. GIS Tutorial 2 Chapter 4 (What's Inside)

*Allen, David. GIS Tutorial 2 Chapter 5 (What's Nearby)

Applications:
(*Recommended*)

Mitchell, Andy. 1999. The ESRI Guide to GIS Analysis Volume 1: Geographic Patterns & Relationships Redland: ESRI Press. *Chapter 3*

Fischer, C. S., G. Stockmayer, et al. (2004). "Distinguishing the Geographic Levels and Social Dimensions of U.S. Metropolitan Segregation, 1960-2000." Demography **41**(1): 37-59.

Logan, J., B. J. Stults, et al. (2004). "Segregations of Minorities in the Metropolis: Two Decades of Change." Demography **41**(1): 1-22.

Edwards Jr, D. D., and N. Darnall "Averting Environmental Justice Claims? The Role of Environmental Management Systems." Public Administration Review **70**(3): 422-433.

Fischer, M. J. (2008). "Shifting Geographies." *Urban Affairs Review*: 475-496.

Rosamond, W. D., L. E. Chambless, et al. (1998). "Trends in incidence of myocardial infarction and in mortality due to coronary heart disease, 1987 to 1994." *New England Journal of Medicine* **339**: 861-867.

Santiago, A. M., G. C. Galster, et al. (2010). "LOW-INCOME HOMEOWNERSHIP: DOES IT NECESSARILY MEAN SACRIFICING NEIGHBORHOOD QUALITY TO BUY A HOME?" *Journal of Urban Affairs* **32**(2): 171-198.

McLafferty, Sara. 2003. "GIS and Health Care" *Annual Review of Public Health*, 24: 25-42. 7

Lecture Series 6: Data Analysis II

Topic

GIS Network Analysis Measuring distances and travel time

Wang, Fahui. *Quantitative Methods and Socio-Economic Applications in GIS*. New York: CRC Press. **Chapter 2**

*ESRI ArcGIS tutorial Geostatistical Analysis
(<http://resources.arcgis.com/en/help/main/10.1/index.html#//0031000000nz000000>)

Applications: *(Recommended)*

Maroko, A., J. Maantay, et al. (2009). "The complexities of measuring access to parks and physical activity sites in New York City: a quantitative and qualitative approach." *International Journal of Health Geographics* **8**(1): 34.

Cromley, Ellen K. 2003. "GIS and Disease" *Annual Review of Public Health*. 24: 7-24

Crampton, J. W. (2004). "GIS and Geographic Governance." *Cartographica* **39**(1): 41-53.

Mennis, J. (2003). "Generating Surface Models of Population Using Dasymetric Mapping." *Professional Geographer* **55**(1): 31-42.

Andresen, M. A. and P. L. Brantingham (2008). "Visualizing Ambient Population Data within Census Boundaries: A Dasymetric Mapping Procedure." *Cartographica* **43**(4): 267-275.

Lecture Series 7: Data Analysis III

Topic

**Trade Areas Analysis
Spatial Accessibility Analysis**

Wang, Fahui. Quantitative Methods and Socio-Economic Applications in GIS. New York: CRC Press. **Chapter 4 & 5**

Lecture Series 8: Data Analysis IV

Topic

**Spatial Cluster Analysis
Average Nearest Neighbor
Getis-Ord General G
Multidistance Clustering**

Wang, Fahui. Quantitative Methods and Socio-Economic Applications in GIS. New York: CRC Press. **Chapter 6 & 8**

Lecture Series 9: Data Analysis V

Topic

**Spatial Smoothing and Spatial Interpolation
Area-based Spatial Interpolation**

Wang, Fahui. Quantitative Methods and Socio-Economic Applications in GIS. New York: CRC Press. **Chapter 3**

Lecture Series 10: Data Analysis VI

Topic

**Spatial analysis
Spatial Correlation
*spatial autocorrelation (global)***

spatial autocorrelation (local)
Spatial regression analysis

Required

*Messner, S. F. and L. Anselin (2004). "Spatial analyses of homicide with areal data." *Spatially integrated social science*: 127–144.

*Provide several tutorial notes for Spatial autocorrelation analyses and spatial regression analysis (in the course dropbox)

Applications:

(Recommended)

Bischoff, K. (2008). "School District Fragmentation and Racial Residential Segregation." *Urban Affairs Review*: 182-217.

Oakley, D. (2008). "Locational Patterns of Low-Income Housing Tax Credit Developments." *Urban Affairs Review*: 599-628.

Saelens, B., J. Sallis, et al. (2003). "Environmental correlates of walking and cycling Findings from the transportation, urban design, and planning literature." *Annals of Behavioral Medicine* **25**(2): 80-91.

Spencer, J. H. (2007). "Neighborhood Economic Development Effects of the Earned Income Tax Credit in Los Angeles: Poor Places and Policies for the Working Poor." *Urban Affairs Review* **42**(6): 851.

Dawes, R. M. (1979). "The robust beauty of improper linear models in decision making." *American Psychologist* **34**: 571-582.

Darmofal, David. 2006. "The political geography of macro-level turnout in American political development," *Political Geography* 25: 123-150.

Koheeld, Carol W., and John Sprague. 2002. "Race, space, and turnout" *Political Geography* 21: 175-193

April 24th

Students' project presentation