

CHRISTOPHER G. PRENER, PH.D.

# READING LIST

SOC 4650 & SOC 5650: INTRODUCTION TO GIS

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SPRING, 2018  
SAINT LOUIS UNIVERSITY



## Reading Notes

Reading Abbreviations	
Abbreviation	Full Title
Brewer	Brewer, C. A. (2015). <i>Designing better maps: A guide for GIS users</i> . Redlands, CA: ESRI Press.
GIS Policy	Thomas, C. & Humenik-Sappington, N. (2009). <i>GIS for decision support and public policy making</i> . Redlands, CA: ESRI Press.
Gorr	Gorr, W. & Kurland, K. (2016). <i>GIS tutorial 1: Basic workbook for arcGIS 10.3.x</i> . Redlands, CA: ESRI Press.
SSDS	Prener, C. (2018). <i>Sociospatial data science</i> .
Wickham	Wickham, H. & Grolemund, G. (2016). <i>R for data science</i> . Sebastopol, CA: O'Reilly.

Reading Locations	
Abbreviation	Location
ER	Electronic Reserves
GH	GitHub
Link	Website URL
PL	Pius Library

*Notes:* Github readings will be available in repository for the week that they are assigned repository; you will need to be a member of the course organization to access them. The password for the Electric Reserves site will be emailed to students at the beginning of the semester.



# *Reading List*

## *Course Preview*

### **Topics**

- Analysis Development - An Opinionated Approach
- GISc and Public Policy - Open Data and GIS in L.A.

### **Videos**

- Coral, L. P. (2016). City of los angeles geohub, San Diego, CA. ESRI User Conference. [[Link](#)]
- Parker, H. (2017a). Opinionated analysis development, Orlando, FL. rstudio::conf. [[Link](#)]

### **Optional Readings**

- Parker, H. (2017b). Opinionated analysis development. *PeerJ PrePrints*. [[Link](#)]

### **Items Due Before *First Class***

- [Course Onboarding](#)
- Lecture Prep 01 - [Course Preview](#)

## Lecture 1 - January 22<sup>nd</sup>

### Course Introduction

#### Topics

- GIScience - What are GIS and GISc?
- Data Management - Intro to R and RStudio
- Data Visualization - What Makes a Good Map, leaflet
- Analysis Development - Workflows
- GISc and Public Policy - What We Learn From Maps

#### Readings

- Goodchild, M. F. (2010). Twenty years of progress: GIScience in 2010. *Journal of spatial information science*, 1(1), 3–20. [\[ER\]](#)
- Logan, J. R. (2012). Making a place for space: Spatial thinking in social science. *Annual review of sociology*, 38, 507–524. [\[ER\]](#)
- SSDS - Chaps. 1 through 5 [\[Link\]](#)
- Wickham:
  - *Print* - Preface  
OR
  - *Web* - Chap. 1 [\[Link\]](#)
- Wilson, G., Bryan, J., Cranston, K., Kitzes, J., Nederbragt, L., & Teal, T. K. (2017). Good enough practices in scientific computing. *PLoS computational biology*, 13(6), e1005510. [\[ER\]](#)

#### Items Due Before Class

- *From Course Preview:* [Course Onboarding](#) and Lecture Prep 01 - [Course Preview](#)

#### Items Due Before Next Class

- *For Next Lecture:* Lecture Prep 02

## Lecture 2 - January 29<sup>th</sup>

### *Working with Data (Part 1)*

#### Topics

- Spatial Data - Types of Data
- Data Management - Visualizing Data
- Analysis Development - Literate Programming, Notebooks, and Replication
- GISc and Public Policy - Open Data and Open GIS; Financial Benefits of GIS

#### Readings

- GIS Policy - Chap. 1, pp. 1-6 & 13-15
- Healy - Chap. 2 [[Link](#)] and 3 [[Link](#)]
- Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). Representing geography. In *Geographic information science and systems* (4th ed., Chap. 3, pp. 55-76). New York, NY: John Wiley & Sons. [[ER](#)]
- SSDS - Chaps. 6 through 10 [[Link](#)]
- Sui, D. (2014). Opportunities and impediments for open GIS. *Transactions in GIS*, 18(1), 1-24. [[ER](#)]
- Wickham:
  - *Print* - Part I Intro + Chaps. 1, 2, 4, and 6
  - OR
  - *Web* - Chaps. 2, 3, 4, 6, and 8 [[Link](#)]

#### Items Due Before Class

- Lecture Prep 02 - R Notebooks

#### Items Due Before Next Class

- Lab 01 - Clean Water Act Data for Missouri Lakes
- *For Final Project*: Memo
- *For Next Lecture*: Lecture Prep 03

*Lecture 3 - February 5<sup>th</sup>*

*The Nature of Spatial Data (Part 1)*

**Topics**

- Spatial Data - Methodological Challenges in GISc
- Data Management - Cleaning Data
- GISc and Public Policy - Decision Making with GIS (Part 1)

**Readings**

- GIS Policy - Chap. 2, pp. 19-30
- Wickham:
  - *Print* - Chaps. 3, 7, and 9
  - OR
  - *Web* - Chaps. 5, 10, and 12 [[Link](#)]

**Items Due Before Class**

- *From Prior Lecture*: Lab 01
- *For Final Project*: Memo
- Lecture Prep 03 - Tibbles

**Items Due Before Next Class**

- Lab 02 - Clean Water Act Data for Missouri Rivers and Streams
- Problem Set 01 - Missouri Dam Data
- *For Next Lecture*: Lecture Prep 04



## Lecture 4 - February 12<sup>th</sup>

### *The Nature of Spatial Data (Part 2)*

#### Topics

- Spatial Data - Representing Geography
- Data Visualization - Tools for Mapping in ArcGIS; Basic Design Principles
- GISc and Public Policy - Decision Making with GIS (Part 2)

#### Readings

- Brewer - Chaps. 1 and 2
- GIS Policy - Chap. 2, pp. 31-44
- Gorr and Kurland - Chap. 1
- Tufte, E. R. (2001b). Data maps. In *The visual display of quantitative information* (2nd ed., pp. 16-27). Cheshire, CT: Graphics Press. [\[ER\]](#)

#### Items Due Before Class

- *From Prior Lecture:* Lab 02, Problem Set 01
- Lecture Prep 04 - Navigating a Map Document

#### Items Due Before Next Class

- Lab 03 - Dangerous Buildings in Kansas City, MO
- Problem Set 02 - Ambulance Districts in Springfield, MO
- *For Next Lecture:* Lecture Prep 05

## Lecture 5 - February 19<sup>th</sup>

### Cartographic Design

#### Topics

- Spatial Data - Cartography and Map Production
- Data Visualization - Designing Maps in ArcGIS; Working with Color
- GISc and Public Policy - Public Participation with GIS (Part 1)

#### Readings

- Brewer - Chaps. 7 and 8
- GIS Policy - Chap. 3, pp. 47-57
- Gorr and Kurland - Chapter 2
- Tufte, E. R. (1990a). Color and information. In *Envisioning information* (pp. 81-95). Cheshire, CT: Graphics Press. [\[ER\]](#)

#### Optional Readings

- Brewer, C. A. (2006). Basic mapping principles for visualizing cancer data using geographic information systems (GIS). *American journal of preventive medicine*, 30(2), S25-S36. [\[ER\]](#)
- Brewer, C. A. (2008). *Designed maps: A sourcebook for GIS users*. Redlands, CA: ESRI Press. [\[PL\]](#)
- Harrower, M. & Brewer, C. A. (2003). Colorbrewer.org: An online tool for selecting colour schemes for maps. *The Cartographic Journal*, 40(1), 27-37. [\[Link\]](#)

#### Items Due Before Class

- *From Prior Lecture*: Lab 03, Problem Set 02
- Lecture Prep 05 - Qualitative Mapping in ArcGIS

#### Items Due Before Next Class

- Lab 04 - U.S. County Population and Tornado Sirens in Jefferson County, MO
- Problem Set 03 - County-level Demographic Maps of Missouri
- *For Next Lecture*: Lecture Prep 06

## Lecture 6 - February 26<sup>st</sup>

### GIS Outputs

#### Topics

- Spatial Data - Geovisualization
- Data Visualization - Building Map Layouts for Dissemination; Map Layouts in R

#### Readings

- Brewer - Chaps. 3 and 4
- Gorr and Kurland - Chap. 3
- Tufte, E. R. (1990b). Small multiples. In *Envisioning information* (pp. 67–79). Cheshire, CT: Graphics Press. [\[ER\]](#)
- Tufte, E. R. (2006). Analytical design. In *Beautiful evidence* (pp. 125–139). Cheshire, CT: Graphics Press. [\[ER\]](#)

#### Items Due Before Class

- *From Prior Lecture*: Lab 04, Problem Set 03
- Lecture Prep 06 - Interactive Maps in ArcGIS

#### Items Due Before Next Class

- Lab 05 - Tornado Tracks in Metro St. Louis
- Problem Set 04 - Unemployment in Metro St. Louis During the Great Recession
- *For Next Lecture*: Lecture Prep 07

*Lecture 7 - March 5<sup>th</sup>*

*Geodatabases*

**Topics**

- Spatial Data - Storing Spatial Data
- Data Management - Dates and Strings
- GISc and Public Policy - Public Participation with GIS (Part 2)

**Readings**

- GIS Policy - Chap. 3, pp. 58-75
- Gorr and Kurland - Chap. 4, pp. 145-154
- Wickham:
  - *Print* - Chaps. 11 and 13
  - OR
  - *Web* - Chaps. 14 and 16 [[Link](#)]

**Items Due Before Class**

- *From Prior Lecture*: Lab 05, Problem Set 04
- Lecture Prep 07 - Writing Data from R

**Items Due Before Next Monday at 5pm**

- Lab 06 - Metro St. Louis Weather Event Geodatabase

*Lecture 8 - March 12<sup>th</sup>*

*Online Lecture: Demographic Data*

**Topics**

- Spatial Data - Georeferenced Demographic Data
- Spatial Research - Writing Papers (SOC 5650 *only*)

**Readings**

- Gorr and Kurland - Chap. 5, pp. 193-203

**Items Due Before Class**

- *From Prior Lecture:* Lab 06

**Items Due Before Next Class**

- Lab 07 - tidycensus
- *For Next Lecture:* Lecture Prep 08

*Note: There is no scheduled class meeting this week. Watch the online lecture on your own and complete the lab assignment.*

*Lecture 9 - March 19<sup>th</sup>*

*Spatial Joins*

**Topics**

- Spatial Data - Combining Data Sources
- Data Management - Table and Spatial Joins
- GISc and Public Policy - GIS and Public Safety (Part 1)

**Readings**

- GIS Policy - Chap. 4, pp. 77-87
- Gorr and Kurland - Chap. 4, pp. 155 onward
- Wickham:
  - *Print* - Chap. 10
  - OR
  - *Web* - Chap. 13 [[Link](#)]

**Items Due Before Class**

- *From Prior Lecture:* Lab 07
- Lecture Prep 08 - Centroids

**Items Due Before Next Class**

- Lab 08 - Dangerous Dams in Metro St. Louis
- Problem Set 05 - Population Health and Health Care Resources in Missouri
- *For Next Lecture:* Lecture Prep 09

## Lecture 10 - March 26<sup>th</sup>

### Working with Projections

#### Topics

- Spatial Data - Projected Coordinate Systems; Projecting x,y Data
- Data Visualization - Typography
- GISc and Public Policy - GIS and Public Safety (Part 2)

#### Readings

- Brewer - Chap. 5
- GIS Policy - Chap. 4, pp. 88-92
- Goor and Kurland - Chap. 5, pp. 175-184
- Maher, M. M. (2013a). Defining projections and their parameters; adding x,y data; analyzing the shape of buffers. In *Lining up data in arcGIS: A guide to map projections* (2nd ed., Chap. 10, pp. 167–182). Redlands, CA: ESRI Press. [\[ER\]](#)
- Maher, M. M. (2013b). Identifying the projected coordinate system. In *Lining up data in arcGIS: A guide to map projections* (2nd ed., Chap. 3, pp. 35–55). Redlands, CA: ESRI Press. [\[ER\]](#)

*Note: Read Maher's (2013) chapter on "Defining Projections" before reading her chapter on "Identifying the Projected Coordinate System". Read both of these before reading the assigned section of Goor and Kurland (2013).*

#### Items Due Before Class

- *From Prior Lecture:* Lab 08, Problem Set 05
- Lecture Prep 09 - World Projections

#### Items Due Before Next Class

- Lab 09 - Health Insurance Coverage Across U.S. Counties
- Problem Set 06 - Stroke Rates Across U.S. Counties
- *For Next Lecture:* Lecture Prep 10

*Lecture 11 - April 4<sup>th</sup>*

*Working with Data (Part 2)*

**Topics**

- Spatial Data - Creating Open GIS Data
- Data Management - Appending and Summarizing Data
- Data Visualization - Mapping and Plotting in R
- GISc and Public Policy - Supporting Decisions and Policy (Part 1)

**Readings**

- GIS Policy - Chap. 5, pp. 93-105
- Healy - Chap. 7 [[Link](#)] and 8 [[Link](#)]
- Tufte, E. R. (2001a). Chartjunk. In *The visual display of quantitative information* (2nd ed., pp. 107–121). Cheshire, CT: Graphics Press. [[ER](#)]

**Items Due Before Class**

- *From Prior Lecture:* Lab 09, Problem Set 06
- Lecture Prep 10 - ggplot2 Refresher

**Items Due Before Next Class**

- Lab 10 - Demolition Permits in City of St. Louis Neighborhoods
- Problem Set 07 - Wellheads in Missouri
- *For Next Lecture:* Lecture Prep 11



*Lecture 12 - April 9<sup>th</sup>*

*Geoprocessing (Part 1)*

**Topics**

- Spatial Data - Modifying Features - Select By, Clip, and Dissolve
- Data Visualization - Labeling Features

**Readings**

- Brewer - Chap. 6
- Gorr and Kurland - Chap. 6, pp. 219-228

**Items Due Before Class**

- *From Prior Lecture:* Lab 10, Problem Set 07
- Lecture Prep 11 - Select by Attributes

**Items Due Before Next Class**

- Lab 11 - Coal Production in Missouri and Illinois
- Problem Set 08 - Petrochemical Infrastructure in Missouri and Metro St. Louis
- *For Next Lecture:* Lecture Prep 12

*Lecture 13 - April 16<sup>th</sup>*

*Geoprocessing (Part 2)*

**Topics**

- Spatial Data - Modifying Features - Merge, Intersect, and Union
- Data Visualization - Customizing Symbols
- GISc and Public Policy - Supporting Decisions and Policy (Part 2)
- Spatial Research - Presenting Results - Tables

**Readings**

- Brewer - Chap. 9
- GIS Policy - Chap. 5, pp. 106-117
- Gorr and Kurland - Chap. 6, pp. 229-238

**Items Due Before Class**

- *From Prior Lecture:* Lab 11, Problem Set 08
- Lecture Prep 12 - Customizing Symbols

**Items Due Before Next Class**

- Lab 12 - Seismic Risk and Activity in Missouri
- *For Next Lecture:* Lecture Prep 13

*Lecture 14 - April 23<sup>rd</sup>**Digitizing Data***Topics**

- Spatial Data - Digitizing Data and Working with Raster Data
- GISc and Public Policy - Supporting Policies with GIS (Part 1)

**Readings**

- GIS Policy - Chap. 7, pp. 135-156
- Gorr and Kurland - Chap. 7

**Items Due Before Class**

- *From Prior Lecture:* Lab 12
- Lecture Prep 13 - Drawing a Polygon

**Items Due Before Next Class**

- Lab 13 - Saint Louis University Landmarks
- *For Next Lecture:* Lecture Prep 14

*Lecture 15 - April 30<sup>th</sup>**Geocoding Data***Topics**

- Spatial Data - Mating Data to ZIP Codes and Street Addresses
- GISc and Public Policy - Supporting Policies with GIS (Part 2)

**Readings**

- GIS Policy - Chap. 7, pp. 157 onward
- Gorr and Kurland - Chap. 8

**Items Due Before Class**

- *From Prior Lecture:* Lab 13
- Lecture Prep 14 - Geocoding by Zip Code

**Items Due Before Next Class**

- Lab 14 - Geocoding Condemned Buildings in St. Louis
- *For Next Lecture:* Lecture Prep 15

*Lecture 16 - May 7<sup>th</sup>*

*Spatial Analyses & Course Wrap-up*

**Topics**

- Spatial Data - Proximity Mapping and Heatmaps

**Readings**

- Gorr and Kurland - Chap. 9, pp. 313-322

**Items Due Before Class**

- *From Prior Lecture:* Lab 14
- Lecture Prep 15 - Buffering

**Items Due Before Final Presentations**

- Lab 15 - L.R.A. Properties in St. Louis
- *For Final Project:* Research Posters
- *For Final Project:* Code and Documentation
- *For Final Project:* Research Papers (SOC 5650 *only*)

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*Finals Week - May 14<sup>th</sup>*

*Course Research Conference*

**Location:** Busch Student Center 173

**Time:** 4:00pm to 5:50pm

**Items Due Before Class**

- *For Final Project:* Research Posters
- *For Final Project:* Code and Documentation
- *For Final Project:* Research Papers (SOC 5650 *only*)