

CP 101 Introduction to Urban Data Analytics (4 credits)

Lecture: Tues/Thurs 4:00–5:30 pm

Labs: (1) Wed 6:00–7:30 pm, (2) Thurs 2:00–3:30 pm

Course Description

This course (1) provides a basic intro to census and economic data collection, processing, and analysis; (2) explores visualization and story mapping techniques in planning; (3) teaches methods of urban analytics; and (4) provides a socio-economic-political context for the urban analytics movement, focusing on data ethics and governance.

Synopsis

CP 101 introduces students to the systematic analysis of urban data in its institutional context. Recognizing that defining this context relies on critical thinking with regard to economic, social, and environmental outcomes, this course explores how stakeholders conceptualize “smart” and inclusive urbanity. Accordingly, this course teaches students systematic approaches to collecting, analyzing, modeling, and interpreting quantitative and qualitative data used to inform robust research, and, ultimately, urban planning practice and policymaking. Beyond instruction in urban data science and analytics, students will be introduced to theory and critical discourses on topics such as big data, open data and e-governance. Instructors will expect students to engage with technical and theoretical - with particular focus placed on ethical - considerations associated with these subjects in lecture and laboratory sections. The course will introduce students to programming in Excel and Python, using open source software, accessing open and scraped data, and other tools and techniques for urban analysis.

The course will be structured following 3 modules:

Module 1: Introduction to Urban Data

During this module students will be introduced to fundamental data applications and ethical dilemmas in urban planning. They will be instructed on sourcing data, analyzing data via statistical testing, and presenting data through written reports and visualizations. In Module 1, students will gain skills in working with Census and economic data, statistical testing, and static data visualization. The deliverable for this module will be a descriptive profile of a Bay Area neighborhood.

Module 2: Mapping the City

In the course's second module, students will learn different tools to make maps. We will gain an understanding of the basic elements of maps, how to map with online programs and geographic information systems software (Carto), and how to construct story map websites. Students will produce a story map as the product for this module.

Module 3: Data Science for Planners: Big Data and Analytics

In the course's final module, students will use knowledge acquired in earlier modules to explore urban data science techniques. Classes will cover topics such as big data, open data, volunteered geographic information, smart cities, and civic hacking; and students will gain skills in real-time and crowd-sourced data collection and use. As the final project for the class, students will use novel sources of data to answer a research question of their choice.

Prerequisites

CP 101 reserves seats for CED and Data Science majors and minors; others can enroll with the permission of the instructor. No prior statistics coursework is assumed. This class provides a foundation to pursue further undergraduate data science courses at UC Berkeley. For Urban Studies, CP 101 satisfies one of the four additional City Planning courses for Upper Division Urban Studies Core. For the City Planning minor, CP 101 satisfies one of the four additional City Planning courses for Upper Division courses under List 1. For SED, CP 101 can count as an Upper Division outside SED major for Fall 2016 admits and later.

Course Requirements

All computer assignments will involve the use of data and software available online or through campus IT, and you will need access to your own computer. We'll be teaching labs for both PC and Mac users. Students will be expected to have a working knowledge of the Microsoft Office Suite - specifically Excel, PowerPoint, and Word - for this course. Students are welcome to explore the use of open software interfaces, such as the R language for statistical computing, the [RStudio](#) package, and the [QGIS project](#); however, please check with the graduate student instructor before using any alternative software. Labs will be offered to introduce students to Excel, Carto, WordPress, and Python programming, as well as census data websites.

Grading, Assignments, and Reading

Students will be expected to read a number of articles/chapters/etc. prior to lecture and lab sessions. For ten sessions, students are asked to submit response questions online on our class bCourses site. We will randomly call on students in each class to discuss questions. Students will be expected to attend and actively participate in one class per week. They will take two midterm quizzes and one lab midterm; complete three group projects; and have the option of a final presentation. Grades will be assigned as follows:

Assignment 1 (Neighborhood Profile):	15%
Assignment 2 (Story Map):	15%
Assignment 3 (Final Project):	25%
Midterm Quiz #1:	5%
Lab Midterm:	15%
Midterm Quiz #2:	10%
Reading Response Questions:	7.5%
Class Participation:	7.5%
<i>Extra credit: Final presentation (up to 3 points)</i>	

Reading Responses

Students are expected to respond to ten different sets of class readings by submitting at least three questions that demonstrate a high level of awareness and react critically to concepts and analyses presented by the readings and could be used to prompt an in-class discussion. Each question should respond to a different reading unless fewer than three readings are assigned. Only the class sessions marked with a * are available for questions; these are the sessions with more theoretical or critical readings, rather than technical texts. During each class, the instructor will randomly select one or more of the questions to read and discuss during the lecture. Questions should be posted by midnight the day before class to the bCourses discussion thread for the lecture (e.g., February 24 for February 25 class).

Assignments

All assignments will be conducted by groups of two students (with more allowed for Assignment 3). For the first two assignments, groups will be assigned randomly by the instructors, who will match students from technical or STEM majors with environmental, social science, or humanities majors (to the extent possible). In the first two assignments (Neighborhood Profile and Story Map), students will explore the phenomenon of neighborhood change through in-depth analysis of census and economic data, as well as story-mapping. The Neighborhood Profile will be a document of 8-10 pages (1.5 spaces), plus appendices (submitted online in Word or as a PDF). The Story Map will consist of an interactive online map, with significant explanatory text.

For the third assignment, students will explore a research question of their own choosing, using big data and/or open data portals, as well as analysis and visualization techniques learned in class. Students may select their own partners for this project, with up to three students per group. This deliverable should include either an online project or a narrative of 15-20 pages (1.5 spaces), including references in proper format. Students will submit a one-page description of their research question and approach in the beginning of April and work closely with the instructors to develop a methodological approach. The semester will culminate with short (5-7 minute) presentations of Assignment 3 (during reading week); this presentation is optional and will be for extra credit.

Exam

There will be a short multiple choice midterm quiz held during the second module to assess student learning of course topics; a midterm lab held after the second module focusing on analytic techniques taught in the first two months of class; and a second midterm quiz held during the third module (a take-home short essay focused on data ethics). The quizzes will be based on the class readings and lectures. The lab midterm will be based on the lab exercises and assignments, with a focus on analytic skills.

Class Format, Attendance, and Participation

Lectures and labs for CP 101 will generally be pre-recorded and available asynchronously. The teaching team will try to post lectures and labs for the week by Monday night at the latest.

Synchronous lectures and labs will take place at the regularly scheduled times. Lectures will consist of about 30 minutes of announcements and discussion, followed by optional help sessions when assignments are due. Students are expected to attend *at least* one class session per week (we will take attendance). In addition to attending, students are expected to actively contribute to class discussions and ask questions. One way to enhance your participation grade is to contribute to the Lecture Discussion on bCourses for the date of the lecture with some questions or observations for us to talk about in class. Participation will be evaluated by instructors based on a combination of attendance, observed engagement and participation, and the bCourse discussion forum.

There are eleven computer labs, which will be pre-recorded as tutorials. Lab attendance is optional but strongly recommended. Lab session time will consist of troubleshooting tricky software issues through live demos and one-on-one help sessions.

We will be using Piazza for class discussion. The system can get you help fast and efficiently from classmates and the teaching team. Rather than emailing questions to the team, I encourage you to post your questions on Piazza. Find our class signup link at: <https://piazza.com/berkeley/spring2021/cp101>

Course Materials

CP 101 has one required book and one optional book. We expect you to purchase the book at the student store, or via an online bookseller. There is no course reader. All readings that are not part of the required book will be posted to the CP 101 bCourses. Also, please see the course website, <http://www.cp101.org>, for a variety of resources related to the course.

Required:

Singleton, Alex, Seth Spielman, and David Folch. 2018. *Urban Analytics*. Thousand Oaks, CA: Sage.

Optional:

Wheelan, Charles. 2013. *Naked Statistics: Stripping the Dread from the Data*. W. W. Norton & Company.

Lecture slides and other course materials will be posted on the CP 101 bCourses site.

Teaching Team and Office Hours

Prof. Karen Chapple (chapple@berkeley.edu): Wed 4-5 PM and Thurs 5:30-6:30 PM (office hours signup [here](#)).

GSIs

- Irene Farah Rivadeneyra (irenef@berkeley.edu): Office hours during Wed lab or by appointment.
- Felicia Jiang (feliciaj@berkeley.edu): Office hours during Thurs lab or by appointment.

Peer consultants (available in lab or by appointment for tutoring):

- Purva Kapshikar, Computer Science '21, pkkapshikar@berkeley.edu
- Isaac Schmidt, Statistics '21, ischmidt20@berkeley.edu
- Rachel Schten, Urban Studies '22, rschten18@berkeley.edu
- Catherine Wang, Data Science '21, catherine.wang@berkeley.edu

Statement on Academic Integrity

Any test, paper or report submitted by you and that bears your name is presumed to be your own original work that has not previously been submitted for credit in another course. You may use words or ideas written by other individuals in publications, websites, or other sources, but only with proper attribution. If you are not clear about the expectations for completing an assignment or taking an exam, be sure to ask a course instructor.

You should also keep in mind that as a member of the campus community you are expected to demonstrate integrity in all of your academic work and be evaluated on your own merits. The consequences of cheating and academic misconduct — including a formal discipline record and possible loss of future opportunities — are not worth the risks.

Statement on Accommodations for Students with Disabilities

If you have been issued a letter of accommodation from the [Disabled Students Program \(DSP\)](#), please see the course lead instructor as soon as possible to work out the necessary arrangements. If you need an accommodation and have not yet seen a Disability Specialist at the DSP, please do so as soon as possible.

If you would need any assistance in the event of an emergency evacuation of the building, the DSP recommends that you make a plan for this in advance. (Contact the DSP access specialist at 643-6456.)

A resource for all accommodations and resources can be found on the EVCP's website, bCourses under Academic Policies, and this link: <https://evcp.berkeley.edu/programs-resources/academic-accommodations-hub>. It includes Classroom Climate, Academic Integrity and Honor Code, Academic Accommodations, and Support Resources (Basic Needs Center, Center of Support and Intervention, Counseling and Psychological Services, Disabled Students' Program, Path to Care, and Social Services at University Health Services), and Conflict resolution.

Statement on Scheduling Conflicts

Please notify course instructors by the second week of the term about any known or potential extracurricular conflicts (such as religious observances, graduate or medical school interviews, or team activities). We will try our best to help you with making accommodations, but cannot promise them in all cases.

Course Schedule - Readings & Assignments

The course schedule/readings are outlined below.

Module 1: Introduction to Urban Data

Tuesday, January 19: Introduction to Urban Analytics* (response due by midnight 1/20)

Singleton, Spielman, and Folch (2018) Chapter 1, "Questioning the city through urban analytics"

Kim, Annette. 2018. <https://www.theatlantic.com/technology/archive/2018/06/satellite-images-can-harm-the-poorest-citizens/561920/>

Optional:

Hollands, Robert G. 2008. "Will the Real Smart City Please Stand up?: Intelligent, Progressive or Entrepreneurial?" *City* 12 (3): 303–20. doi:10.1080/13604810802479126.

Thursday, January 21: Data Fundamentals for Planners*

Singleton, Spielman, and Folch (2018) Chapter 2, "Sensing the city"

Boyd, Danah, and Kate Crawford. 2012. "CRITICAL QUESTIONS FOR BIG DATA: Provocations for a Cultural, Technological, and Scholarly Phenomenon." *Information, Communication & Society* 15 (5): 662–79. doi:10.1080/1369118X.2012.678878.

Neruda, Pablo, and Margaret Sayers Peden. 1986. "Ode to Numbers." *The Massachusetts Review* 27 (3/4): 464–66.

Wheelan (2013) Chapter 7, "The Importance of Data" (recommended)

Lab 1 (optional): Introduction to Excel

Tuesday, January 26: Metadata: Understanding the US Census*

Jurjevich et al. 2018. Navigating Statistical Uncertainty: How Urban and Regional Planners Understand and Work with American Community Survey (ACS) Data for Guiding Policy. *Journal of the American Planning Association*, 84(2), 112-126.

B. Strasser and P. Edwards, "[Big Data is the Answer... But What is the Question?](#)" *Osiris* 32, 2017: pp. 328-345
Jurjevich, J. R., Griffin, A. L., Spielman, S. E., Folch, D. C., Merrick, M., & Nagle, N. N. (2018).

Alba, Richard. 2015. "The Myth of a White Minority." *The New York Times*, June 11. <http://www.nytimes.com/2015/06/11/opinion/the-myth-of-a-white-minority.html>

Thursday, January 28: Using Census Data

Bureau, U. S. Census. 2020. <http://data.census.gov>
Social Explorer. 2020. <http://www.socialexplorer.com/>

U.S. Bureau of the Census, TO. 2009. "A Compass for Using and Understanding American Community Survey Data." [for reference only]
<https://www.census.gov/content/dam/Census/library/publications/2009/acs/ACSRsearch.pdf>

Lab 2: Downloading and Using Census Data

Tuesday, February 2: Stats and the American Community Survey

Cochran, Abby. 2020. Stats for CP 101 (Video available on bCourses or Youtube).
https://www.youtube.com/channel/UCQXYyiiiTwzrlKjpQ3tDcPw/featured?view_as=subscriber

Wheelan (2013) Chapters 2, 3, & 4 "Descriptive Statistics," "Descriptive Deception," "The Central Limit Theorem" (recommended)

Thursday, February 4: Static Data Visualization*

Few, Stephen. 2012. *Show Me the Numbers: Designing Tables and Graphs to Enlighten*. 2nd ed. USA: Analytics Press. [Lots of pictures, quick reading!] Chapter 3 pg. 39-60 "Differing Roles of Tables and Graphs", Chapter 4 pp. 53-60 "Fundamental Variations of Tables" Chapter 5 pg. 67-79 "Attributes of Pre-attentive Processing & "Applying Visual Attributes to Design", Chapter 6 pg. 101-135 "Graph Design Solutions", Chapter 11 pg. 257-270 "Displaying Many Variables at Once", Chapter 13 pg. 295-306 "Telling Compelling Stories with Numbers", Appendix A "Table and Graph Design at a Glance" pg. 309-310

Tufte, Edward R. 1983. *The Visual Display of Quantitative Information*. Graphics Press. Chapter 2, "Graphical Integrity".

Optional:

Check out Piktochart for infographics, www.piktochart.com. And the whole Tufte book is great – especially check out Chapter 1, "Graphical Excellence."

Lab 3: Excel Basics and Generating Charts

Tuesday, February 9: Neighborhood Data and Indicators: The Urban Displacement Project*

Singleton, Spielman, and Folch (2018) Chapter 5, "Differences Within Cities"

Chapple & Zuk, "Forewarned: The Use of Neighborhood Warning Systems for Gentrification and Displacement," <https://www.huduser.gov/portal/periodicals/cityscape/vol18num3/article5.html>

Urban Displacement Project, www.urbandisplacement.org [SKIM]

Thursday, February 11: Introduction to Economic Data and the Longitudinal Household-Employment Data

Abowd, J. J., Haltiwanger, J., & Lane, J. (2004). Integrated longitudinal employer-employee data for the United States. *American Economic Review*, 94(2), 224-229.

Lab 4: Calculating Margins of Error; Accessing Census and Economic Data via Social Explorer; Accessing Local Employment-Household Dynamics Data

Assignment #1 due Tuesday, February 16!

Module 2: Mapping the City

Tuesday, February 16: Spatial Data & GIS Fundamentals* (Guest: Irene Farah Rivadeneyra)

Singleton, Spielman, and Folch (2018) Chapter 4, "Visualizing the city"

Monmonier, Mark. 1996 Chapters 1, 2, 3, 4, and 10 *How to Lie with Maps*. University of Chicago Press.

Additional GIS mapping information: <http://www.icsm.gov.au/education/fundamentals-mapping>

Thursday, February 18: Accessibility* (Guest: Chester Harvey)

Hamraie, Aimi. 2018. "A Smart City Is an Accessible City." *The Atlantic*. November 6, 2018. <https://www.theatlantic.com/technology/archive/2018/11/city-apps-help-and-hinder-disability/574963/>.

Walker Jarrett. 2011. "Transit's product: mobility or access?" *Human Transit*. January 16, 2011. <https://humantransit.org/2011/01/transits-product-mobility-or-access.html>

Optional:

"Curb Cuts." 2018. 99% Invisible (blog). Accessed May 23, 2018. <https://99percentinvisible.org/episode/curb-cuts/>.

Samuel D. Blanchard and Paul Waddell. 2017. "UrbanAccess: Generalized Methodology for Measuring Regional Accessibility with an Integrated Pedestrian and Transit Network." *Transportation Research Record: Journal of the Transportation Research Board*. No. 2653. pp. 35–44.

Lab 5: Carto Part I

Tuesday, February 23: Introduction to Story Mapping

Examples to review:

- The Lines that Shape our Cities
<https://storymaps.arcgis.com/stories/0f58d49c566b486482b3e64e9e5f7ac9>
- The Evolution of the American Census: <https://pudding.cool/2020/03/census-history/>
- Displacement in the Bay Area: <http://www.antievictionmap.com/#!/narratives-of-displacement/>
- Mapping Segregation in DC.
<http://jmt.maps.arcgis.com/apps/MapJournal/?appid=061d0da22587475fb969483653179091>
- Creating a neighborhood change zoning plan for Spruce Hill
<https://storymaps.arcgis.com/stories/378dcb733ffe4698b97ce8cd2884b3dd>
- Gangs of Los Angeles (2015):
http://maps.google.com/gallery/details?id=zMC7tfcRop6s.koD9cCcyHJ_0&hl=en
- Atlas for a Changing Planet: <http://storymaps.esri.com/stories/2015/atlas-for-a-changing-planet/>
- Katrina +10: A Decade of Change in New Orleans:
<http://story.maps.arcgis.com/apps/MapSeries/index.html?appid=597d573e58514bdbbeb53ba2179d2359>
- Nature –Based Climate Solutions by The Nature Conservancy
https://storymaps.arcgis.com/stories/a891b41520c343a582b845dcbb89e48b?utm_source=sfmc_100035609&utm_medium=email&utm_campaign=33180+Boiling+Point&utm_term=http%3a%2f%2fstorymaps.arcgis.com%2fstories%2fa891b41520c343a582b845dcbb89e48b&utm_id=16333&sfmc_id=1028842
- River of Forgiveness <https://riverofforgiveness.com/home>

You can find more examples at ESRI's gallery: <https://www.esri.com/en-us/arcgis/products/arcgis-storymaps/overview>

Thursday, February 25: Participatory Mapping*

For this lecture, please watch Erin McElroy, The Ethics and Data of Mapping Displacement,
<https://www.youtube.com/watch?v=xvHqBP6RPis>

Parker, Brenda. "Constructing Community through Maps? Power and Praxis in Community Mapping." *Professional Geographer*, 58:4, (2006): 470-484.

Norwood, Carla, and Gabriel Cumming. "Making maps that matter: Situating GIS within community conversations about changing landscapes." *Cartographica: The International Journal for Geographic Information and Geovisualization* 47.1 (2012): 2-17.

Check out the [Street Story](#) Project

Lab 6: Carto Part II

Tuesday, March 2: Power, Place and Mapping (Guest TBD)*

Harley, J. Brian. "Maps, knowledge, and power" (Chapter 8). In Henderson, George and Waterstone, Marvin. *Geographic thought: a praxis perspective*, 1988. 129-148.

Thursday, March 4: Midterm Quiz #1, no class

Lab 7: OCF/WordPress and Embedding Carto Maps

Assignment #2 due Tuesday, March 9!

Module 3: Data Science for Planners: Big Data and Analytics

Tuesday, March 9: Introduction to Big Data*

Foster, Ian, Rayid Ghani, Ron S. Jarmin, Frauke Kreuter, and Julia Lane. 2017. "Introduction." Pp. 1-19 in *Big Data and Social Science: A Practical Guide to Methods and Tools*. Boca Raton, FL: Taylor & Francis Group.

Gitelman, Lisa and Virginia Jackson. 2013. Introduction. *Raw data is an oxymoron*. MIT Press.

Crawford, Kate. 2013. "The hidden biases in big data." *Harvard Business Review* 1.

Thursday, March 11: Big Data – and Ethics -- for Planners*

Schweitzer, Lisa. 2014. "Planning and Social Media: A Case Study of Public Transit and Stigma on Twitter." *Journal of the American Planning Association* 80 (3): 218–38.

Crawford, Kate. "[The Trouble with Bias](#)", NIPS conference keynote, December 2017 (especially minutes 14:00 - 38:00) https://www.youtube.com/watch?v=fMym_BKWQzk

Barocas, S. and d. boyd (2017) "[Engaging the Ethics of Data Science in Practice](#)," Communications of the ACM, Vol. 60 No. 11, Pages 23-25.

M. Zook, S. Barocas, d. boyd, K. Crawford, E. Keller, S.P. Gangadharan, et al. (2017) "[Ten simple rules for responsible big data research](#)." PLoS Comput Biol 13(3).

No Lab - Lab Midterm this week!!

Tuesday, March 16: Complex Urban Modeling: Machine Learning (Guest TBD)*

Foster, Ian et al. 2017. "Machine Learning." Pp. 147-186 in *Big Data and Social Science: A Practical Guide to Methods and Tools*. Boca Raton, FL: Taylor & Francis Group.

Pedro Domingos, [A Few Useful Things to Know About Machine Learning](#) (2012)

Thursday, March 18: Using Data Science to Understand Segregation and Evictions*
(Guest [Tim Thomas](#))

NO LAB THIS WEEK!!!

Week of March 22-26: NO CLASS, SPRING BREAK!!

Tuesday, March 30: Research Design and Urban Data Science*

Singleton, Spielman, and Folch (2018) Chapter 6, "Explaining the city"

Kontokosta, Constantine E. "Urban informatics in the science and practice of planning." *Journal of Planning Education and Research* (2018): 0739456X18793716.

Thursday, April 1: Volunteered Geographic Information (Guest TBD)*

Jiang, Bin, and Jean-Claude Thill. 2015. "Volunteered Geographic Information: Towards the Establishment of a New Paradigm." *Computers, Environment and Urban Systems*, Special Issue on Volunteered Geographic Information, 53 (September): 1–3.

Boeing, Geoff, and Paul Waddell. 2016. "New Insights into Rental Housing Markets Across the United States: Web Scraping and Analyzing Craigslist Rental Listings." *Journal of Planning Education and Research*.

Shelton, Taylor, Ate Poorthuis, and Matthew Zook. "Social media and the city: Rethinking urban socio-spatial inequality using user-generated geographic information." *Landscape and Urban Planning* 142 (2015): 198-211.

Tuesday, April 6: Urban Data Analytics*

G.C. Bowker and S.L. Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge, MA: MIT Press, 2000), [Introduction \("To Classify is Human"\)](#), read pp. 1-16.

Suel, Esra, John W. Polak, James E. Bennett, and Majid Ezzati. "Measuring social, environmental and health inequalities using deep learning and street imagery." *Nature scientific reports* 9,1 (2019): 1-10. <https://www.nature.com/articles/s41598-019-42036-w>

Stewart, Matthew. 2019. "The Real Estate Sector is Using Algorithms to Work Out the Best Places to Gentrify." *Failed Architecture*. <https://failedarchitecture.com/the-extractive-growth-of-artificially-intelligent-real-estate/>

Wheelan (2013) Chapters 8 & 11, "Correlation", "Regression Analysis" (recommended)

Optional:

Reades, J., De Souza, J., & Hubbard, P. (2018). Understanding urban gentrification through machine learning. *Urban Studies*, 0042098018789054.

Lab 8: Python - Intro to Jupyter/Python/Pandas

Thursday, April 8: Open Data & Using Portals (Guest TBD)*

Lohr, Steve. 2016. "Website Seeks to Make Government Data Easier to Sift Through." *The New York Times*, April 4. <http://www.nytimes.com/2016/04/05/technology/datausa-government-data.html>.

Spiker, Steve. 2013. "Oakland and the Search for the Open City." Pp. 105-124 in *Beyond Transparency: Open Data and the Future of Civic Innovation*. San Francisco, CA: Code for America.

Johnson, Jeffrey Alan. 2014. "From Open Data to Information Justice." *Ethics and Information Technology* 16 (4): 263–74. doi:10.1007/s10676-014-9351-8.

Lab 9: Python - Web Scraping

Tuesday, April 13: Interactive Visualizations*

Hemmersam, Peter, Nicole Martin, Even Westvang, Jonny Aspen, and Andrew Morrison. 2015. "Exploring Urban Data Visualization and Public Participation in Planning." *Journal of Urban Technology* 22 (4): 45–64. doi:10.1080/10630732.2015.1073898.

Anderson, Meghan Keaney. 2016. "12 Complex Concepts Made Easier Through Great Data Visualization — ReadThink (by HubSpot)." Medium. June 27. <https://readthink.com/12-complex-concepts-made-easier-through-great-data-visualization-c94950277fed#.lqiypvba>.

Explore additional interactive visualizations here:

<http://polygraph.cool/history/>

<http://goodcitylife.org/chattymaps/index.html>

<http://hubcab.org/#13.00/40.7219/-73.9484>

<http://218consultants.com/interactive-suitability-map/> (Look at all 3 interactive maps)

<https://ourworldindata.org/a-history-of-global-living-conditions-in-5-charts/>

<http://www.urban.org/features/vision-equitable-dc>

and of course, <http://www.urbandisplacement.org!>

Optional:

Foster, Ian et al. 2017. "Working with Web Data and APIs." Pp. 23-70 and "Information Visualization." Pp. 243-263 in *Big Data and Social Science: A Practical Guide to Methods and Tools*. Boca Raton, FL: Taylor & Francis Group.

Thursday, April 15: Defining Smart Cities in Theory and Practice* (Guest TBD)

Batty, M. 2016. "How Disruptive Is the Smart Cities Movement?" *Environment and Planning B: Planning and Design* 43 (3): 441–43. doi:10.1177/0265813516645965.

Shelton, Taylor, Matthew Zook, and Alan Wiig. 2015. "The 'Actually Existing Smart City.'" *Cambridge Journal of Regions, Economy and Society* 8 (1): 13–25. doi:10.1093/cjres/rsu026.

P. Dourish, *Code and the City*, Rob Kitchin and Sung-Yueh Perng, eds. (Routledge, 2016), "[The Internet of Urban Things](#)," pp. 27-49 [Links to PDF in bCourses].

T. Misra, "[The New Digital Sanctuaries](#)," *Citylab*, November 14, 2017.

Lab 10: Python – Mapping with Geopandas

Tuesday, April 20: Smart Institutions & e-Governance (Guest TBD)*

Noveck, Beth Simone. 2015. *Smart Citizens, Smarter State: The Technologies of Expertise and the Future of Governing*. Harvard University Press.; Chapter 1 & Conclusion, "From Open Government to Smarter Governance", pg. 1 - 43; "Conclusion: The Daedalus Project", pg. 267 – 275

V. Eubanks, "[Want to Predict the Future of Surveillance? Ask Poor Communities](#)," *The American Prospect*, January 15, 2014.

Also look over: <https://smartcitizen.me/>

For a great example of an open data site, see data.mesaaz.gov

Thursday, April 22: Civic Hacking and Equity (Guest TBD)*

Barns, Sarah. "Mine your data: open data, digital strategies and entrepreneurial governance by code." *Urban Geography* 37.4 (2016): 554-571.

Lab 11: Python - Working with Big Data

Tuesday, April 27: Presenting Data

Schwabish, Jonathan. 2017. Chapter 1 “Theory, Planning and Design”; Chapter 4 “The Text Slide”; and Chapter 5 “The Data Visualization Slide”; in *Better Presentations: A Guide for Scholars, Researchers, and Wonks*. New York: Columbia University Press.

Tufte, Edward, R. 2003. *The Cognitive Style of PowerPoint*. Graphics Press.

Doumont, Jean-luc. 2005. “The Cognitive Style of PowerPoint: Slides Are Not All Evil.” *ResearchGate* 52 (1): 64–70.

Parker, Ian. May 28, 2001. Absolute Powerpoint: Can a software package edit our thoughts? *The New Yorker*. <http://www.newyorker.com/magazine/2001/05/28/absolute-powerpoint>

Optional:

Schwabish, Jonathan. 2017. Chapter 2 “Color” in *Better Presentations: A Guide for Scholars, Researchers, and Wonks*. New York: Columbia University Press.

Thursday, April 29: The Inclusive Smart City*

Singleton, Spielman, and Folch (2018) Chapter 8, pg. 151 “Networks Supporting Human Progress” & Chapter 9, “The Future of Urban Analytics”

Zook, Matthew. 2016. “Crowd-sourcing the Smart City: Using Big Geosocial Media Metrics in Urban Governance.” Unpublished paper.

Lab 12: Open Help Session (optional)

Assignment #3 due Friday, May 7!