USING DATA TO DESCRIBE THE WORLD: DESCRIPTIVE SOCIAL SCIENCE RESEARCH TECHNIQUES
EDUC 430C / SOC 258

Course Syllabus, Spring 2022

professor:
sean f. reardon   class: mondays & wednesdays, 9:45 AM - 11:15 AM, CERAS 108
                                                                                   office hours: by appointment

teaching assistants:
jessica boyle
                                                        office hours: tuesdays, 9:45-11:15AM (Canvas); by appointment

kaylee matheny
                                                        office hours: wednesdays, 11:30-1:00PM (Canvas); by appointment

Course aims
This course focuses on the skills needed to conduct theoretically informed and policy-relevant descriptive social science. Students will read recent examples of rigorous descriptive quantitative research that exemplifies the use of data to describe important phenomena related to educational and social inequality. The course will help skills develop skills necessary to conceptualize, operationalize, and communicate descriptive research, including techniques related to measurement and measurement error, data harmonization, data reduction, and visualization. Students will develop a descriptive project during the course.

The course is designed for graduate students with prior training in multivariate statistics and broad exposure to quantitative social science research. Satisfactory completion of a graduate course in multivariate regression is a prerequisite for enrollment.

Readings
Readings will be available on Canvas, either as .pdf files or as links to online resources. In addition, lecture notes and other course materials will be posted on the Canvas site.

Auditors
Auditors are allowed in the course, with permission of the instructor.

Assignments and Grading

Memos (3 total)—*total of 75% of final grade*
Students will write three memos for the course, corresponding to the three sections of the course. Students will determine a substantive project of interest, and will write three memos that build on each other to develop a descriptive analysis.

Each memo will count for 25% of the course grade. Students taking the course for 3 credits may work in pairs on the memos (same pair for all three memos); students taking the course for 4-5 credits must work alone. Students working in pairs will receive the same grade as each other for each assignment.

In the first memo, students will identify a descriptive research question of theoretical- and/or policy-relevance, discuss how and why one might conceptualize and operationalize the phenomena of interest, and discuss the descriptive comparisons of interest.

In the second memo, students will discuss how they might answer the descriptive questions posed in their first memo with available data. The memo will describe how the phenomena of interest might be operationalized, the challenges that available data pose, and how issues of validity, reliability, uncertainty, and comparability can be addressed.

The third memo will be cumulative, incorporating the first two memos, and will present descriptive findings, a discussion of the choices made in visualizing the results, an interpretation of the results, and a discussion of potential ways to challenge or corroborate this interpretation.

Class participation—*total of 25% of final grade*
Students are expected to do all reading for the course carefully in advance of the class sessions and participate in discussion of the readings, class concepts, and research ideas of their classmates. Note that this participation will often include coming to class with a question about a pre-recorded lecture and/or prepared to share about a specific aspect of the readings. Students are also expected to meet with someone from the teaching team at least once during Part I and again during Part II of the course. Note that class participation includes two brief (3-5 minute) class presentations during the last 2 weeks of the quarter—the first on May 18th and the second on either May 25th or June 1st.

Office hours
Office hours are available by appointment. Please schedule office hours through Canvas.

A note on academic integrity
Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating information, facilitating acts of academic dishonesty by others, and submitting the work of another person or work previously used without informing the instructor. The Honor Code, outlining the general expectations pertaining to Academic Integrity applicable to this course, is published in the Graduate Student Handbook available at: http://honorcode.stanford.edu. Students are expected to conform to the highest standards of academic integrity in this course — meaning, essentially, don't lie; don't cheat; don't pass off someone else's work as your own.

A note for students with disabilities
Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Office of Accessible Education (OAE). Professional staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an Accommodation Letter for faculty dated in the current quarter in which the request is being made. Students should contact the OAE as soon as possible since timely notice is needed to coordinate accommodations. The OAE provides supports via online (see here) this quarter.

A note for bloggers, tweeters, and other internet hipsters
One benefit of the computer age is the availability of computers, with which one can take notes during class. If you find such computerized note-taking useful, I encourage it. Please use your laptop computer politely in class, and keep your phone turned off so as not to distract others and so that you can focus on the course.

<u>Course Outline</u>

<u>Week 1:</u>
Monday, March 28th

Introduction

<u>Required Readings:</u>

Loeb, S., Dynarski, S., McFarland, D., Morris, P., Reardon, S., & Reber, S. (2017). Descriptive analysis in education: A guide for researchers. (NCEE 2017–4023). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. https://ies.ed.gov/ncee/pubs/20174023/pdf/20174023.pdf

PART I: CONCEPTUALIZATION

Wednesday, March 30th

<u>Required Readings:</u>

Loeb, S., Dynarski, S., McFarland, D., Morris, P., Reardon, S., & Reber, S. (2017). Descriptive analysis in education: A guide for researchers. (NCEE 2017–4023). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. https://ies.ed.gov/ncee/pubs/20174023/pdf/20174023.pdf

Chetty, R., Friedman, J., Saez, E., Turner, N., & Yagan, D. (2017). *Mobility report cards: The role of colleges in intergenerational mobility* (No. 23618; NBER Working Paper Series). https://doi.org/10.3386/w23618

Chetty, R. [Opportunity Insights] (2019, May 14). *Lecture 06 Higher Education and Upward Mobility* [Video]. YouTube. https://www.youtube.com/watch?v=oKY4n-_G4cE

<u>Week 2:</u>
Monday, April 4th

Learning loss during the COVID-19 pandemic

<u>Guest Lecture:</u> Megan Kuhfeld, *NWEA*

<u>Required Readings:</u>

Bacher-Hicks, A. and Goodman, J. (2021). The Covid-19 pandemic is a lousy natural experiment for studying the effects of online learning: Focus, instead, on measuring the overall effects of the pandemic itself. *Education Next*, *21*(4), 38-42.

https://www.educationnext.org/covid-19-pandemic-lousy-natural-experiment-for-studying-the-effects-online-learning/

Domingue, B., Dell, M., Lang, D. N., Silverman, R. D., Yeatman, J. D., & Hough, H. (2021). The effect of COVID on oral reading fluency during the 2020-2021 academic year. https://doi.org/10.35542/osf.io/6zqjr

Pier, L. Hough, H. J., Christian, M., Bookman, N. Wilkenfeld, B., & Miller, R. (2021). *COVID-19 and the educational equity crisis.* https://edpolicyinca.org/newsroom/covid-19-and-educational-equity-crisis (full report listed below in Supplemental Readings).

Kuhfeld, M., Soland, J., and Lewis, K. (2022). Test score patterns across three Covid-19-impacted school years. (EdWorkingPaper: 22-521). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/ga82-6v47

Kuhfield, M. (2022). Recorded lecture on recent Covid-19 research. Available on Canvas.

Supplemental Readings:

Kuhfeld, M., Soland, J., Tarasawa, B., Johnson, A., Ruzek, E., & Liu, J. (2020). Projecting the potential impact of COVID-19 school closures on academic achievement. *Educational Researcher*, *49*(8), 549-565. https://journals.sagepub.com/doi/full/10.3102/0013189X20965918

Pier, L., Christian, M., Tymeson, H., & Meyer, R. H. (2021, June). COVID-19 impacts on student learning: Evidence from interim assessments in California [Report]. Policy Analysis for California Education. https://edpolicyinca.org/publications/covid-19-impacts-student-learning

Wednesday, April 6th

Early Childhood Education

Guest Lecture: Daphna Bassok *University of Virginia*

Supplemental Lecture: attend CEPA talk by Anjali Adukia (April 7)

Required Readings:

Bassok, D., Markowitz, A. J., Bellows, L., & Sadowski, K. (2021). New Evidence on Teacher Turnover in Early Childhood. Educational Evaluation and Policy Analysis, 43(1), 172–180. https://doi.org/10.3102/0162373720985340

Bassok, D., Latham, S., & Rorem, A. (2016). Is kindergarten the new first grade? *AERA Open*, *2*(1). https://doi.org/10.1177/2332858415616358

Reardon, S. F., & Portilla, X. A. (2016). Recent trends in income, racial, and ethnic school readiness gaps at kindergarten entry. *AERA Open*, *2*(3). https://doi.org/10.1177/2332858416657343

Adukia, A., Eble, A., Harrison, E., Runesha, H. B., & Szasz, T. (2021). *What we teach about race and gender: Representation in images and text of children's books* (No. 29123; NBER Working Paper Series). https://doi.org/10.3386/w29123

Bassok, D. (2022). Recorded lecture ECE teacher turnover. Available on Canvas.

<u>Supplemental Readings:</u>

Bellows, Laura, Daphna Bassok, and Anna J. Markowitz. (2021). Teacher Turnover in Early Childhood Education: Longitudinal Evidence from the Universe of Publicly-Funded Programs in Louisiana. (EdWorkingPaper: 21-453). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/f9bz-fs97

Doromal, Justin B., Daphna Bassok, Laura Bellows, and Anna J. Markowitz. (2021). Hard-to-Staff Centers: Exploring Center-Level Variation in the Persistence of Child Care Teacher Turnover. (EdWorkingPaper: 21-474). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/qre0-4661

Bassok, D., Finch, J. E., Lee, R., Reardon, S. F., & Waldfogel, J. (2016). Socioeconomic gaps in early childhood experiences: 1998 to 2010. *AERA Open*, *2*(3), 1–22. https://doi.org/10.1177/2332858416653924

Friday, April 8th

Preliminary research topic due; 1 week left to meet with the teaching team & get topic approved

<u>Week 3:</u>
Monday, April 11th

Trends in educational attainment

<u>Guest Speaker:</u> Fabian Pfeffer, *University of Michigan*

Bailey, M., & Dynarski, S. (2011). Gains and gaps: Changing inequality in U.S. college entry and completion. In *National Bureau of Economic Research* (No. 17633; NBER Working Paper Series). https://doi.org/10.3386/w17633

Leonhardt, D. (2018, March 25). The growing college graduation gap. *The New York Times*. https://www.nytimes.com/2018/03/25/opinion/college-graduation-gap.html

Pfeffer, F. T. (2018). Growing wealth gaps in education. *Demography*, *55*(3), 1033–1068. https://doi.org/10.1007/s13524-018-0666-7

Supplemental Readings:

Barro, R. J., & Lee, J. W. (2013). A new data set of educational attainment in the world, 1950-
2010. *Journal of Development Economics*, *104*, 184–198.
https://doi.org/10.1016/j.jdeveco.2012.10.001

Goldin, C., Katz, L. F., & Kuziemko, I. (2006). The homecoming of American college women: The
reversal of the college gender gap. *Journal of Economic Perspectives*, *20*(4), 133–156.
https://doi.org/10.1257/jep.20.4.133

Heckman, J. J., & LaFontaine, P. A. (2010). The American high school graduation rate: Trends and
levels. *Review of Economics and Statistics*, *92*(2), 244–262.
https://doi.org/10.1162/rest.2010.12366

Murnane, R. J. (2013). U.S. high school graduation rates: Patterns and explanations. *Journal of
Economic Literature*, *51*(2), 370–422. https://doi.org/10.1257/jel.51.2.370

Murnane, R. J., & Reardon, S. F. (2018). Long-term trends in private school enrollments by family
income. *AERA Open*, *4*(1). https://doi.org/10.1177/2332858417751355

Wednesday, April 13th

Achievement patterns and achievement gaps

Required Readings:

Chmielewski, A. K. (2019). The global increase in the socioeconomic achievement gap, 1964 to
2015. *American Sociological Review*, *84*(3), 517–544.
https://doi.org/10.1177/0003122419847165

Jang, H., & Reardon, S. F. (2019). States as sites of educational (in)equality: State contexts and the
socioeconomic achievement gradient. *AERA Open*, *5*(3).
https://doi.org/10.1177/2332858419872459

Reardon, S. F., & Galindo, C. (2009). The Hispanic-White achievement gap in math and reading in
the elementary grades. *American Educational Research Journal*, *46*(3), 853–891.
https://doi.org/10.3102/0002831209333184

Reardon, S. F., Kalogrides, D., & Shores, K. (2019). The geography of racial/ethnic test score gaps.
American Journal of Sociology, *124*(4), 1164–1221. https://doi.org/10.1086/700678

Friday, April 15th

Research topics must be finalized and approved by the teaching team; all students must have met
at least once with the teaching team at this point

PART II: MEASUREMENT AND OPERATIONALIZATION

<u>Week 4:</u>
<u>Monday, April 18th</u>

Variation: School Funding Patterns

<u>Guest Speaker:</u> Kenneth Shores*, University of Delaware*

<u>Required Readings:</u>

Anglum, J. C., Shores, K. A., & Steinberg, M. P. (2021). *Federal stimulus aid and school finance: Lessons from the Great Recession* (No. 21–497; EdWorkingPaper Series). https://www.edworkingpapers.com/ai21-497

Baker, B. D., Di Carlo, M., Schneider, M., & Weber, M. (2021). *The adequacy and fairness of state school finance systems: Key findings from the School Finance Indicators Database* (Issue January). https://eric.ed.gov/?id=ED606197

Chingos, M. M., & Blagg, K. (2017). Do poor kids get their fair share of school funding? In *Education Policy Program* (Issue May). https://www.urban.org/sites/default/files/publication/90586/school_funding_brief.pdf

Lee, H., Shores, K., & Williams, E. (2021). *The distribution of school resources in the United States: A comparative analysis across levels of governance, student sub-groups, and educational resources* (No. 21–443; EdWorkingPaper Series). https://doi.org/10.26300/58f3-6v39

Roza, M., Hagan, K., & Anderson, L. (2021). Variation is the norm: A landscape analysis of weighted student funding implementation. *Public Budgeting and Finance*, *41*(1), 3–25. https://doi.org/10.1111/pbaf.12276

Shores, K. A., Candelaria, C. A., & Kabourek, S. E. (2021). Spending more on the poor? A comprehensive summary of state-specific responses to school finance reforms from 1990–2014. *Education Finance and Policy*, 1–50. https://doi.org/10.1162/edfp_a_00360

Shores, Kenneth A., and Matthew P. Steinberg. (2022). *Fiscal federalism and k-12 education funding: Policy lessons from two educational crises.* (No. 22-550; EdWorkingPaper Series). Retrieved from Annenberg Institute at Brown University: https://doi.org/10.26300/yqfy-5h36

<u>Supplemental Readings:</u>

EdBuild. (2019). *$23 billion*. https://edbuild.org/content/23-billion/full-report.pdf
Read the appendices.
Also see https://edbuild.org/content/23-billion

Griffith, M. (2020). *The impact of the COVID-19 recession on teaching positions*. https://learningpolicyinstitute.org/blog/impact-covid-19-recession-teaching-positions

Roza, M., Hadley, L., & Jarmolowski, H. (2020). *School spending data: A new national data archive*. Rockville, MD: National Comprehensive Center at Westat. https://www.compcenternetwork.org/sites/default/files/School%20Spending%20Data.pdf
Also see https://edunomicslab.org/

Wednesday, April 20th

Harmonizing Data and Dealing with missing data: Segregation

Guest Speaker: Heewon Jang, *Stanford University*

Supplemental Lecture: attend CEPA talk by Ann Owens (April 21)

Required Readings:

Fahle, E. M., Reardon, S. F., Kalogrides, D., Weathers, E. S., & Jang, H. (2020). Racial segregation and school poverty in the United States, 1999–2016. *Race and Social Problems*, *12*(1), 42–56. https://doi.org/10.1007/s12552-019-09277-w

Orfield, G., & Frankenberg, E. (2014). *Brown at 60: Great progress, a long retreat and an uncertain future*. https://civilrightsproject.ucla.edu/research/k-12-education/integration-and-diversity/brown-at-60-great-progress-a-long-retreat-and-an-uncertain-future

Owens, A., Reardon, S. F., & Jencks, C. (2016). Income segregation between schools and school districts. *American Educational Research Journal*, *53*(4), 1159–1197. https://doi.org/10.3102/0002831216652722

Reardon, S. F., & Owens, A. (2014). 60 years after Brown: Trends and consequences of school segregation. *Annual Review of Sociology*, *40*(1), 199–218. https://doi.org/10.1146/annurev-soc-071913-043152

Supplemental Readings:

Chang, A. (2018, March). The data proves that school segregation is getting worse. *Vox*. https://www.vox.com/2018/3/5/17080218/school-segregation-getting-worse-data

Verbuggen, R. (2018, February 16). The resegregation myth. *The National Review*. https://www.nationalreview.com/magazine/2018/02/17/the-resegregation-myth/

Week 5:
Monday, April 25th

Memo 1 due

Harmonizing Achievement Data

Guest Speaker: Anna Katyn Chmielewski

Required Readings:

(Review) Chmielewski, A. K. (2019). The global increase in the socioeconomic achievement gap, 1964 to 2015. *American Sociological Review*, *84*(3), 517–544. https://doi.org/10.1177/0003122419847165

Reardon, S. F. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In G. J. Duncan & R. J. Murnane (Eds.), *Whither opportunity? Rising inequality, schools, and children's life chances* (pp. 91–115). Russell Sage Foundation. https://inequality.stanford.edu/sites/default/files/The%20Widening%20Income%20Achievement%20Gap%20Between%20the%20Rich%20and%20The%20Poor.pdf

Reardon, S. F., Kalogrides, D., & Ho, A. D. (2021). Validation methods for aggregate-level test scale linking: A case study mapping school district test score distributions to a common scale. *Journal of Educational and Behavioral Statistics*, *46*(2), 138–167. https://doi.org/10.3102/1076998619874089

Supplemental Readings:

Hanushek, E. A., Peterson, P. E., Talpey, L. M., & Woessmann, L. (2020). *Long-run trends in the U.S. SES-achievement gap* (No. 26764; NBER Working Paper Series). https://doi.org/10.3386/w26764

Hashim, S., Kane, T. J., Kelley-Kemple, T., Laski, M. E., & Staiger, D. O. (2022). *Have income-based achievement gaps widened or narrowed?* (No. 27714; NBER Working Paper Series). https://doi.org/10.3386/w27714

Reardon, S. F. (2011). Online Appendix 5: The widening achievement gap between the rich and the poor: New evidence and possible explanations. In G. J. Duncan & R. J. Murnane (Eds.), *Whither opportunity? Rising inequality, schools, and children's life chances*. Russell Sage Foundation. https://www.russellsage.org/sites/default/files/duncan_murnane_online_appendix.pdf pages 49-108

Reardon, S. F. (2021). *The economic achievement gap in the U.S., 1960-2020: Reconciling recent empirical findings* (No. 21–09; CEPA Working Paper Series). https://cepa.stanford.edu/content/economic-achievement-gap-us-1960-2020-reconciling-recent-empirical-findings

Wednesday, April 27th

Measurement challenges

Guest Speaker: Emily Gutierrez and Kristin Blagg, *Urban Insitute*

Required Readings:

Blagg, K., Gutierrez, E., Terrones, F., & Garriga, G. (2021). *Identifying a new "at-risk" measure* (Issue December). https://www.urban.org/research/publication/identifying-new-risk-measure

Domina, T., Pharris-Ciurej, N., Penner, A. M., Penner, E. K., Brummet, Q., Porter, S. R., & Sanabria, T. (2018). Is free and reduced-price lunch a valid measure of educational disadvantage? *Educational Researcher*, *47*(9), 539–555. https://doi.org/10.3102/0013189X18797609

Michelmore, K., & Dynarski, S. (2017). The gap within the gap. *AERA Open*, *3*(1). https://doi.org/10.1177/2332858417692958

Supplemental Readings:

https://www.urban.org/features/measuring-student-poverty-dishing-alternatives-free-and-reduced-price-lunch

Friday, April 30th

2 weeks left to fulfill office hours requirement for Part II

Week 6:
Monday, May 2nd

Using novel and found data to measure complex phenomena

Guest Speaker: Rachel Baker, *University of Pennsylvania*

Required Readings:

Baker, R., & Orona, G. A. (2020). Gender and racial differences in awareness and consideration of curricular programs: Exploring a multistage model of major choice. *AERA Open*, *6*(3). https://doi.org/10.1177/2332858420937023

Baker, R., Xu, D., Park, J., Yu, R., Li, Q., Cung, B., Fischer, C., Rodriguez, F., Warschauer, M., & Smyth, P. (2020). The benefits and caveats of using clickstream data to understand student self-regulatory behaviors: Opening the black box of learning processes. *International Journal of Educational Technology in Higher Education*, *17*(1), 1–24. https://doi.org/10.1186/s41239-020-00187-1

Supplemental Readings:

Li, Q., Baker, R., & Warschauer, M. (2020). Using clickstream data to measure, understand, and support self-regulated learning in online courses. *Internet and Higher Education*, *45*(July 2019), 100727. https://doi.org/10.1016/j.iheduc.2020.100727

Wednesday, May 4th

Statistical adjustments & conditional associations

Guest Speaker: Jordan Conwell, *University of Texas at Austin*
Supplemental Lecture: attend CEPA talk by Jordan Conwell (May 5)

Required Readings:

Conwell, J. A. (2021). Diverging disparities: Race, parental income, and children's math scores, 1960 to 2009. *Sociology of Education*, *94*(2), 124–142. https://doi.org/10.1177/0038040720963279

Conwell, J. A., & Ye, L. Z. (2021). All wealth is not created equal: Race, parental net worth, and children's achievement. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, *7*(3), 101–121. https://doi.org/10.7758/RSF.2021.7.3.05

Week 7:
Monday, May 9th

Describing language

Guest Speaker: Dora Demszky*, Stanford University*

Required Readings:

Demszky, D., Liu, J., Mancenido, Z., Cohen, J., Hill, H., Jurafsky, D., & Hashimoto, T. (2021). Measuring conversational uptake: A case study on student-teacher interactions. *59th Annual Meeting of the Association for Computational Linguistics Conference Proceedings*, 1638–1653. https://doi.org/10.18653/v1/2021.acl-long.130

Fesler, L., Dee, T., Baker, R., & Evans, B. (2019). Text as data methods for education research. *Journal of Research on Educational Effectiveness*, *12*(4), 707–727. https://doi.org/10.1080/19345747.2019.1634168

Lucy, L., Demszky, D., Bromley, P., & Jurafsky, D. (2020). Content analysis of textbooks via natural language processing: Findings on gender, race, and ethnicity in Texas U.S. history textbooks. *AERA Open*, *6*(3). https://doi.org/10.1177/2332858420940312
Also see https://www.nytimes.com/interactive/2020/01/12/us/texas-vs-california-history-textbooks.html

There are two videos for Dora Demszky. Please be sure to watch the one marked "req" (for required) for the class. There is also an optional recording if you would like to watch that, as well.

Wednesday, May 11th

Measurement error

Guest Speaker: Josh Gagné, *Stanford University*

Required Readings:

Rothstein, J., & Wozny, N. (2013). Permanent income and the Black-White test score gap. *Journal of Human Resources*, *48*(3), 509–544. https://doi.org/10.3368/jhr.48.3.510

(Review) Reardon, S. F. (2011). Online Appendix 5: The widening achievement gap between the rich and the poor: New evidence and possible explanations. In G. J. Duncan & R. J. Murnane (Eds.), *Whither opportunity? Rising inequality, schools, and children's life chances*. Russell Sage Foundation. https://www.russellsage.org/sites/default/files/duncan_murnane_online_appendix.pdf pages 49-108

(Review) Reardon, S. F., Kalogrides, D., & Shores, K. (2019). The geography of racial/ethnic test score gaps. *American Journal of Sociology*, *124*(4), 1164–1221. https://doi.org/10.1086/700678

Friday, May 13th

By this point, all students must have met at least once with the teaching team since April 18th

PART III: INTERPRETATION, COMMUNICATION, AND VISUALIZATION

Week 8:
Monday, May 16th

Memo 2 due

Data Visualization Examples

Wednesday, May 18th

Research communication

Guest Speaker: Carissa Carter, Stanford d.school

Required Readings:

https://apps.urban.org/features/school-funding-do-poor-kids-get-fair-share/
https://edbuild.org/content/23-billion
https://edopportunity.org/
https://www.opportunityatlas.org/

<u>Week 9:</u>
Monday, May 23rd

Data Visualization Lecture

Wednesday, May 25th

Data Visualization Workshop

<u>Week 10:</u>
Monday, May 30th

HOLIDAY – no class

Wednesday, June 1st

Student Visualization Presentation Day

Friday, June 3rd

Memo 3 due (cumulative)