

PLUS 668: Big Data for Planning and Development

Fall 2022 Syllabus

Instructor: Dr. Kevin Kane

Course Overview

This course provides an introduction to the role of data and analytics in planning and development processes with a particular focus on emerging sources and applications of so-called “Big Data.”

Students will engage with conceptual material through readings, discussion, lectures, and guest interviews, learning about examples of big data analysis in business, planning, and transportation from leaders in the field. Readings will cover the ontology of “Big Data,” its applications in urban social science, and critical discussions about the efficacy and equity surrounding big data, machine learning, and related topics in society.

Students will engage with technical material through labs using the R Statistical Programming Language and GeoDa spatial analysis software and will develop mastery of accessing, processing, and visualizing Census and American Community Survey data. While advanced programming and Geographic Information Systems (GIS) skills are beyond the scope of this course, students will gain a basic understanding of command line-based data analysis and spatial data handling.

Intended Learning Outcomes

- Develop an appreciation for what makes “Big Data” distinctive from conventional data sources.
- Understand how Big Data analysis can and cannot impact analytical research results, planning outcomes, and the development process.
- Understand what is meant by data flows, data openness, and data engagement in both conceptual and technical contexts.
- Understand the fundamentals of what is needed to conduct Big Data analysis by using a statistical programming language with a command-line interface.
- Understand the fundamentals of spatial data handling and visualization using open-source spatial analysis software.
- Develop an appreciation of the skill sets, workflows, and information required to conduct data analysis and big data analysis for planning and development applications.
- Become a critical consumer, user, and contributor to big data, machine learning, and related concepts in the urban realm by understanding not only the promise of big data but also its pitfalls and potential for reinforcing inequities.

Additional Course Requirements

This course requires students to have a computer which is capable of running the R statistical programming software (in addition to its companion interface, RStudio), as well as the GeoDa spatial analysis software. These programs are open source and free of charge and can be run on standard Window, Macintosh, or Linux systems.

R: www.r-project.org

Rstudio: www.rstudio.com

GeoDa: <https://spatial.uchicago.edu/software>

Assessments and Grading

Assignments are due at the beginning of the sync session corresponding to the course schedule below, unless otherwise noted by the instructor. Late assignments will be graded down substantially, up to 10% for 24 hours late or up to 30% for one week late, at the discretion of the instructor. A passing grade will not be assigned until all assignments have been completed.

Attendance and active engagement in course materials and during the sync sessions is expected and mandatory. Since a large portion of out-of-class time will be dedicated to technical material, the effective use of in-class time to engage with conceptual material is of high importance. Participation grades will be marked down for unexcused absences or non-completion of async material. The out-of-class time commitment required for learning technical material and completing labs will be significant and will vary based on the student's prior experience with data analysis and computer programming. Students are encouraged to work together to solve technical and programming challenges; however, labs are to reflect individual final work and any evidence of plagiarism or copying submitted material will not be tolerated.

In order to facilitate optimal use of class time for learning conceptual material, each student will be assigned to one of the course's nine conceptual weeks in order to lead a discussion of the assigned readings and, secondarily, async material. Discussion leads are expected to conduct an especially thorough reading of course material for their week and will provide an outline of the material's key points and several discussion questions to the instructor in advance of the sync session. Since the length and complexity of the assigned readings varies, students should be prepared, if needed, to include additional outside resources and materials to facilitate further understanding of the topic.

- (7.5%) What is Big Data to you? Written assignment at beginning of course
- (7.5%) What is Big Data to you? Written assignment at end of course
- (15%) Discussion lead
- (15%) Personal Big Data resources list. Written assignment at end of course
- (30%) Labs 1-3
- (20%) Lab 4
- (5%) Participation

Course Schedule

Week	Orientation	Readings	Assignments
1: Course Introduction			
2: What Is Big Data?	Conceptual	Arribas-Bel, D. 2014. Accidental, open and everywhere: Emerging data sources for the understanding of cities. <i>Applied Geography</i> , 49, 45-53. Doi: 10.1016/j.apgeog.2013.09.012	What is Big Data to you I due.

		Kitchin, R., & McArdle, G. 2016. What makes Big Data, Big Data? Exploring the ontological characteristics of 26 datasets. <i>Big Data & Society</i> . 3(1). Doi: 10.1177/2053951716631130	
3: Big Data and transportation planning	Conceptual	Batty, M. 2013. Big data, smart cities and city planning. <i>Dialogues in Human Geography</i> , 3(3), 274-279. Doi: 10.1177/2043820613513390 Goodspeed, R., Yuan, M., Krusniak, A., & Bills, T. 2021. Assessing the Value of New Big Data Sources for Transportation Planning: Benton Harbor, Michigan Case Study. In <i>Urban Informatics and Future Cities</i> (pp. 127-150). Springer, Cham. Optional/for reference only: Glaeser, E., Kominers, S., Luca, M., & Naik, N. 2018. Big Data and Big Cities: The Promises and Limitations of Improved Measures of Urban Life. <i>Economic Inquiry</i> 56:1 1, 114–137. Doi: 10.1111/ecin.12364	
4: Data analysis in R (1 of 2)	Technical	For reference only: Machlis, S. and Ambrosio, J. 2013. Learn to use R: Your hands-on guide. <i>Computer World</i> . https://www.computerworld.com/article/2497143/	Begin Lab 1.
5: Data analysis in R (2 of 2)	Technical		
6: Spatial analysis in GeoDa	Technical	For reference only: GeoDa documentation (http://geodacenter.github.io/documentation.html)	Begin Lab 2. Lab 1 due.
7: Open GIS and Web GIS	Conceptual	Arribas-Bel, D., Green, M., Rowe, F., & Singleton, A. 2021. Open data products—A framework for creating valuable analysis ready data. <i>Journal of Geographical Systems</i> 23: 497-514. doi:10.1007/s10109-021-00363-5 Anselin, L., Sridharan, S., & Gholston, S. 2007. Using Exploratory Spatial Data Analysis to Leverage Social Indicator Databases: The Discovery of Interesting Patterns. <i>Social Indicators Research</i> 82(2), 287-309. doi: 10.1007/s11205-006-9034-x	
8: Business applications of big data	Conceptual	Shelton, T., Poorthuis, A., & Zook, M. 2015. Social media and the city: Rethinking urban socio-spatial inequality using user-generated geographic information. <i>Landscape and Urban Planning</i> 142: 198-211. doi: 10.1016/j.landurbplan.2015.02.020 Alder, L. 2015. The Urban Internet of Things: Surveying Innovations Across City Systems. 31 August. https://datasmart.ash.harvard.edu/news/article/the-urban-internet-of-things-727	Lab 2 due.

9: Citizen sensors and citizen science	Conceptual	<p>Goodchild, M. 2007. Citizens as sensors: The world of volunteered geography. <i>GeoJournal</i> 69: 211-221. doi: 10.1007/s10708-007-9111-y</p> <p>Gebu, T., Krause, J., et al. 2017. Using deep learning and Google Street View to estimate the demographic makeup of neighborhoods across the United States. <i>Proc Natl Acad Sci U S A</i> 114(50), 13108-13113. doi: 10.1073/pnas.1700035114</p> <p>Optional/for reference only: See, L., Mooney, P., et al. 2016. Crowdsourcing, Citizen Science or Volunteered Geographic Information? The Current State of Crowdsourced Geographic Information. <i>ISPRS International Journal of Geo-Information</i> 5(5), 55. doi: 10.3390/ijgi5050055</p>	
10: Data flows	Technical		Begin Lab 3.
11: Student data analysis	Technical		Begin Lab 4.
12: Big Data and land use	Conceptual	<p>Estiri, H., & Afzalan, N. 2017. Towards data-driven cities: Incorporating big data into urban management. In L. A. Schintler & Z. Chen (Eds.), <i>Big Data for Regional Science</i>. London: Routledge.</p> <p>Kane, K. and Clark, W.A.V. Mapping the landscape of urban work: Home-based businesses and the built environment. <i>Environment and Planning A</i> 51:2. doi: 10.1177/0308518X18762131</p>	Lab 3 due.
13: Being a critical consumer, user, & contributor	Conceptual	<p>O'Neil, C. (2016). <i>Weapons of Math Destruction</i>. New York: Broadway Books. Introduction, Chapters 1-2.</p> <p>Optional for sync discussion: O'Neil chapters 3-4.</p>	
14: Weapons of math destruction	Conceptual	<p>O'Neil chapters 5, 8, 9</p> <p>Optional for sync discussion: O'Neil chapters 6, 7, 10</p>	Lab 4 due.
15: Is what happens any different?	Conceptual	<p>O'Neil conclusion chapter</p> <p>Shearmur, R. 2015. Dazzled by data: Big Data, the census and urban geography. <i>Urban Geography</i>, 36(7), 965-968. doi: 10.1080/02723638.2015.1050922</p>	Big data resource list due. What is Big Data to you II due.*

**Assignment will not be due at the beginning of lecture. Due date will be announced and will be coordinated with the university semester schedule for course completion.*

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on Research and Scholarship Misconduct.

Students and Disability Accommodations

USC welcomes students with disabilities into all of the University’s educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
eeotix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776

osas.usc.edu

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

ombuds.usc.edu

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-3340 or otfp@med.usc.edu

chan.usc.edu/otfp

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.