Reducing Drug-Related Harms Using Big Data: Administrative, Geospatial, and Network Sources

Emory University
Spring 2023

Meeting room:	R. Randall Rollins Bldg. R340
Meeting times:	Wednesdays, 2:30pm – 5:30pm
Credit hours:	4
Pre-requisites:	Familiarity and comfort with the following is needed to successfully complete the course:

- Regression (e.g. BIOS 501, BSHES 700)
- SAS (e.g.BIOS 501)
- R (e.g. BIOS 544)

INSTRUCTORS:

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Please feel free to contact us anytime via email with questions related to the course or your shared interest in substance use-related harm. We will endeavor to respond within 48 hours.

COURSE DESCRIPTION:

This course will prepare students to conduct ethical, rigorous, and theoretically-informed analyses of three types of "big data" (administrative, geospatial, and social network data) in the context of research and interventions into intersecting crises of substance use disorders (SUDs) and drug-related harms. It will apply the strengths of social and behavioral sciences – including a focus on theory and validity – to the emerging field of advanced data analytics. This course will require computing in different programs and different environments. Familiarity and comfort with the following is needed to successfully complete the course:

This course is one of two courses on analyzing "big data" to study and intervene in drug-related harms (the other course is entitled "Reducing Drug-Related Harms Using 'Big Data': Gene*Environment Interplays and Machine Learning"). We recommend, but do not require, taking this course first.

COURSE COMPETENCIES:

Trainees will learn to:

- Design and conduct theoretically-informed analyses of distributions and ecologies of SUD-related harms by applying advanced data science methods to administrative data, geospatial data, and sociometric network data.
- Design and conduct theoretically-informed analyses assessing policies and programmatic interventions that may affect SUD-related harms and services by applying advanced data science methods to administrative data, geospatial data, and sociometric network data.
- Communicate findings to select stakeholder communities to strengthen efforts to end SUD-related harms.
- Critically apply principles of the ethical and responsible conduct of research.

COURSE LEARNING OBJECTIVES:

Upon completion of this course, the student will be able to:

1. Design theoretically guided analyses describing distributions and ecologies of SUD-related harms and services using appropriate data science methods for administrative data, geospatial data, and sociometric network data.
2. Conduct theoretically guided analyses describing distributions and ecologies of SUD-related harms and services using appropriate data science methods for administrative data, geospatial data, and sociometric network data.
3. Design theoretically guided analyses of policies and programmatic interventions that may affect SUD-related harms and services using appropriate data science methods for administrative data, geospatial data, and sociometric network data.
4. Conduct theoretically guided analyses of policies and programmatic interventions that may affect SUD-related harms and services using appropriate data science methods for administrative data, geospatial data, and sociometric network data.
5. Compare the rigor (e.g., validity) of various data science methods as tools to study and intervene in SUD-related harms and services.
6. Communicate the rationale, methods, findings, and conclusions of theoretically guided analyses of administrative data, geospatial data, and sociometric network data describing distributions and ecologies of SUD-related harms and services to diverse audiences.
7. Communicate the rationale, methods, findings, and conclusions of theoretically guided analyses of policies and programmatic interventions that may affect SUD-related harms and services to diverse audiences.
8. Assess ethical issues posed by each data science method and consider the responsible conduct of related analyses, particularly as applied to SUD-related research.

COURSE MATERIALS:

Mandatory Synchronous Class Sessions
Each class section will meet with Professor Cooper, Professor Waller, or Professor An.

Textbook

- **There is no required textbook.**
- It is your responsibility to review the required readings for each week. These same readings will be used for a weekly asynchronous assignment.

Technology

- This course uses synchronous meetings and delivery of asynchronous content delivered via Canvas. Click here for a PDF of the Emory College Online technology requirements.
- Lecture slides will be made available to all students via Canvas.
- Zoom meeting links will be made available prior to class if/when it is determined that a session/sessions will not meet in person.

The Canvas Learning Management System

- This course will use a Canvas site for communication and posting of course materials (e.g. documents, exams, assignments, lecture slides, supplemental readings, Kahoot surveys, etc.).
- It is your responsibility to check this site regularly to stay up-to-date on announcements and assignments.
- Computer specifications for Canvas
- Canvas Resources for Students

Office Hours Tools

- Office hours for each professor will be held in-person each week and will be relayed at the start of the semester and posted on Canvas.

Library Resources & Online Videos

- This course will refer to scientific publications that can be accessed on the internet. Emory University Libraries provides access to all databases online.
- A guide to library research tools is online.
- This course will also use videos that are shown in-class or as recommended viewing. Some videos will be available on the internet via YouTube.

COURSE POLICIES

Attendance

Attendance at assigned class is mandatory – you will be marked absent if you miss class. Students are expected to be active learners and participants. Evidence of this includes:

- Attending and being on-time. Please see the Absence Policy for more details on how this affects grading.
- Should the circumstances of the pandemic require that we switch the course format to zoom meetings, students are required to be visually present during Zoom meetings. In such instances:
  - The camera on your device should be turned on. Your mic will be muted. A raised hand should be used to indicate you have a question/comment relevant to the material being presented.
  - Your zoom name should match your real name. This will allow TAs to confirm your attendance for the duration of each lecture.
- Being engaged by asking questions and contributing to class discussions. Students will be able to submit anonymous questions during each class session.

Assignments

- Assignments include answering specific questions after reviewing and interpreting the assigned readings and completing laboratory assignments each week.
- Assignments must be written in your own words. Submitted assignments must have a Canvas plagiarism/"similarity score" < 25%. See here for info.
- Assignments must be submitted via Canvas, per instructions, by the due date indicated at the time of distribution.
  - Canvas will not allow late assignments to be submitted.
  - Assignments should be submitted well in advance of the 11:59 PM deadline.
  - Assignments cannot be made up at a later time. *Exceptions to this policy will require explicit permission of the instructor in writing, prior to the due date.*
- Questions about assignments should be emailed to the professors.

Grading Policy (+ Extra Credit Opportunity)

- Earned points at the end of the semester are used to determine each student's grade.
- Appeals to final grade decisions should be submitted (in writing) to the Director of Graduate Studies in RSPH.

Lectures & Zoom Videos of Synchronous sessions (in case of switch to online learning)

- Lectures and other classroom presentations via video conferencing and other materials posted on Canvas are for the sole purpose of educating the students enrolled in the course.
  - *These lectures and videos are the property of the instructors. The release of such information (including but not limited to directly sharing, screen capturing, or recording content) is strictly prohibited, unless the instructors state otherwise. Doing so without the permission of the instructor will be considered an Honor Code violation, and may also be a violation of state or federal law, such as the Copyright Act.*
- All University policies remain in effect for students participating in remote education.
- Videos will only show the PowerPoint slides and include the voice of the instructor.
- Videos will become available several days after class in order to allow time for processing and editing.
- Videos are not a stand-in for synchronous class attendance, which is required (see attendance policy).

Written Communication with the Instructor

- We will respond to written communications within 48 business hours.
- Use email as the primary mode for communication, especially if your email will contain personal information, such as grades, attendance, illness, etc.
    - As a general rule, email communications with instructors should be conducted in a professional manner:
        - An email and all subsequent replies should include appropriate salutation and valediction statements and your signature.
        - The body must not always be formal, but it should be written in a respectful tone (i.e. If you would hesitate to say something to someone's face, do not write it in an e-mail.).
        - Strive for clarity; after reading the email once, the recipient should be able to understand the purpose and context of the email and your expected or desired response.
        - Strive for brevity; lengthy questions and/or explanations are more appropriate for a synchronous online meeting.
        - The email should contain correct grammar and punctuation, and it should not contain terms or abbreviations that are adapted specifically for text messaging or social media.

LGS & RSPH POLICIES

Laney Graduate Student Handbook

The Laney Graduate School Handbook (https://gs.emory.edu/handbook/) is the official reference for graduate students and others regarding the administrative and procedural policies, as well as the rules and regulations, of the Laney Graduate School. If you have questions about specific policies, please contact the appropriate LGS staff member for assistance.

Accessibility and Accommodations

As the instructors of this course we endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with us and the Office of Accessibility Services (OAS). Accessibility Services works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, you must contact the OAS. It is the responsibility of the student to register with OAS. Please note that accommodations are not retroactive and that disability accommodations are not provided until an accommodation letter has been processed.

Students who registered with OAS and have a letter outlining their academic accommodations are strongly encouraged to coordinate a meeting time with me to discuss a protocol to implement the accommodations as needed throughout the semester. This meeting should occur as early in the semester as possible.

Contact Accessibility Services for more information at (404) 727-9877 or accessibility@emory.edu. Additional information is available at the OAS website at http://equityandinclusion.emory.edu/access/students/index.html

Emory COVID-19 Policies

All Emory University students, faculty, and staff are required to be fully vaccinated for COVID-19. Campus members who have an approved vaccination exemption or anyone not yet fully vaccinated are required to conduct regular screening tests. At this time, testing is required weekly, however, frequency could increase depending on community prevalence. Testing procedures and scheduling information are available on Emory Forward's testing information page.

Please visit Emory University's website on Navigating COVID-19 to stay informed of the latest guidance and policies regarding COVID-19.

Honor Code

You are bound by Emory University's Student Honor and Conduct Code. Students enrolled in Laney Graduate School (LGS) will follow the LGS Policies and Honor Code. Students enrolled in RSPH will follow the policies and honors of RSPH. The LGS honor code is available at: https://gs.emory.edu/handbook//honor-conduct-grievance/honor/index.html.

RSPH requires that all material submitted by a student fulfilling his or her academic course of study must be the original work of the student. Violations of academic honor include any action by a student indicating dishonesty or a lack of integrity in academic ethics. *Academic dishonesty refers to cheating, plagiarizing, assisting other students without authorization, lying, tampering, or stealing in performing any academic work, and will not be tolerated under any circumstances.*

The RSPH Honor Code states: "Plagiarism is the act of presenting as one's own work the expression, words, or ideas of another person whether published or unpublished (including the work of another student). A writer's work should be regarded as his/her own property."

Stress Management and Mental Health

As a student, you may find that personal and academic stressors in your life, including those related to illness, economic instability, and/or racial injustice, are creating barriers to learning this semester. Many students face personal and environmental challenges that can interfere with their academic success and overall wellbeing. If you are struggling with this class, please visit me during office hours or contact me via email at name@emory.edu. If you are feeling overwhelmed and think you might benefit from additional support, please know that there are people who care and offices to support you at Emory. These services – including confidential resources – are provided by staff who are respectful of students' diverse backgrounds. For an extensive list of well-being resources on campus, please go to: http://campuslife.emory.edu/support/index.html. And keep in mind that Emory offers free, 24/7 emotional, mental health, and medical support resources via TimelyCare: https://timelycare.com/emory.

Other Emory resources include:

1. Counseling & Psychological Services
2. Office of Spiritual & Religious Life
3. Student Case Management and Interventions Services
4. Student Health Services Psychiatry
5. Support During A Crisis: A Guide for Faculty & Staff
6. Emory Anytime Student Health Services

ASSIGNMENTS AND GRADING

Your final grade is a weighted average of the following four components:

	Points Distribution
Attendance & Participation	**30%**
Case study final project	**40%**
Laboratory Assignments	**15%**
Other Written Assignment + Posts	**15%**
Course Total:	**100%**

93 and above	A
90 to 92.99	A-
87 to 89.99	B+
83 to 86.99	B
80 to 82.99	B-
70 to 79.99	C
0 to 69.99	F

LECTURE SCHEDULE OVERVIEW

	Date	Topic	Instructor
MODULE I: ADMINISTRATIVE DATABASES	Jan-11	Course Introduction	Cooper
	Jan-18	Introduction to Administrative Data	Cooper
	Jan-25	Deep dive into Administrative Data	Cooper
	Feb-1	Administrative Data & Validity	Cooper
	Feb-8	Linking Administrative Data Across Databases	Cooper
MODULE 2: GEOSPATIAL DATA ANALYSIS	Feb-15	Theory of local influences on drug-related health outcomes	Cooper/Waller
	Feb-22	Cartography and communication	Waller
	Mar-1	Maps and theories of substance use	Waller
	Mar-8	NO CLASS - Spring Break	
	Mar-15	Local risk and resiliency	Waller
	Mar-22	Geographic analysis	Waller
MODULE 3: SOCIAL NETWORK ANALYSIS	Mar-29	Introduction to Social Networks and Health	An
	Apr-5	Random Network Models	An
	Apr-12	Network Effects	An
	Apr-19	Dynamic Network Analysis	An
	Apr-26	Interventions and Ethical Issues	An

Module 1: Administrative Data

In this module, students will be introduced to the course and will learn to conduct ethical, rigorous, and theoretically-informed analyses of administrative data in the context of research and interventions into intersecting crises of SUDs and drug-related harms.

Jan-11 (Hannah Cooper)	
Pre-lecture videos	○ Two videos
Class session	**Introduction to the course** ○ **First hour:** Intersecting epidemics of drug-related harms and related intersectional inequities ○ **Second hour:** Integrating advanced data analysis into the social and behavioral lifecycle to end drug-related harms **Third hour:** Cook & Campbell's Validity framework
Lab	Introduction to the case study
Readings	**The Epidemiology of drug-related harms** Furr-Holden, D., Milam, A. J., Wang, L., & Sadler, R. (2020). African Americans now outpace whites in opioid-involved overdose deaths: A comparison of temporal trends from 1999 to 2018. *Addiction*, *116*(3), 677–683. https://doi.org/10.1111/add.15233 Friedman J, Mann NC, Hansen H, et al. Racial/Ethnic, Social, and Geographic Trends in Overdose-Associated Cardiac Arrests Observed by US Emergency Medical Services During the COVID-19 Pandemic. *JAMA Psychiatry*. 2021;78(8):886–895. doi:10.1001/jamapsychiatry.2021.0967 **Big Data and the Social and Behavioral Sciences** Kaplan, R. M., Riley, W. T., & Mabry, P. L. (2014). News from the NIH: leveraging big data in the behavioral sciences. *Translational behavioral medicine*, *4*(3), 229-231. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4167902/ Forum, N. C. P., Nass, S. J., Patlak, M., Zevon, E., Balogh, E., & National Academies of Sciences, Engineering, and Medicine. (2020, July). Proceedings of a Workshop. In *Applying Big Data to Address the Social Determinants of Health in Oncology: Proceedings of a Workshop*. National Academies Press (US). https://www.ncbi.nlm.nih.gov/books/NBK561300/ **Introduction to Validity** Matthay, E. C., & Glymour, M. M. (2020). A Graphical Catalog of Threats to Validity: Linking Social Science with Epidemiology. *Epidemiology (Cambridge, Mass.)*, *31*(3), 376. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7144753/

Jan-18 (Hannah Cooper)	
Pre-Lecture Videos	○ Two videos
Class session	Administrative Data and their utility in studying the impacts of laws on drug-related health outcomes and intersectional inequities ○ First hour: Theory and the Public Health Law Research Model ○ Second hour: Introduction to Administrative Data ○ Third hour: Overdose Lab
Lab	Applying and comparing different algorithms to assess overdoses
Readings	**The Importance of Theory:** Krieger, N. (2011). *Epidemiology and the people's health: theory and context*. Oxford University Press. Chapter 1 (pgs 3-42). **Theoretical Model: Public health law research** Wagenaar, A. C., & Burris, S. C. (Eds.). (2013). *Public health law research: theory and methods*. John Wiley & Sons. Chapter 3. **Administrative data** Connelly, R., Playford, C. J., Gayle, V., & Dibben, C. (2016). The role of administrative data in the big data revolution in social science research. *Social science research*, *59*, 1-12.

Jan-25 (Hannah Cooper)	
Pre-Lecture Videos	○ One video
Class session	Deep dive into Administrative Data and Coverage ○ First hour: The Census, gender, and race: from the 3/5th compromise to the carceral state ○ Second hour: NSDUH & coverage of people who use drugs Third hour: Ethics and administrative data
Lab	Case Study: Introduction to case study, and estimating the impact of undercoverage by race/ethnicity, gender, and citizenship in the US census on denominators
Readings	**Who Counts in Administrative Data?: Coverage** Runes, Charmaine. *Urban Wire: Race and Ethnicity*, 2019, www.urban.org/urban-wire/following-long-history-2020-census-risks-undercounting-black-population. **Ethics** Foster, I., Ghani, R., Jarmin, R. S., Kreuter, F., & Lane, J. (Eds.). (2016). *Big data and social science: A practical guide to methods and tools*. crc Press. Chapter 12: Privacy and Confidentiality. Goroff, D., Polonetsky, J., & Tene, O. (2018). Privacy protective research: Facilitating ethically responsible access to administrative data. *The ANNALS of the American Academy of Political and Social Science*, *675*(1), 46-66. **Gentrification** Smith, G.S., Breakstone, H., Dean, L.T. *et al.* Impacts of Gentrification on Health in the US: a Systematic Review of the Literature. *J Urban Health* 97, 845–856 (2020). https://doi.org/10.1007/s11524-020-00448-4 **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7704880/pdf/11524_2020_Article_448.pdf** Hwang, J., & Lin, J. (2016). What have we learned about the causes of recent gentrification? *Working Paper (Federal Reserve Bank of Philadelphia)*. https://doi.org/10.21799/frbp.wp.2016.20 **https://www.huduser.gov/portal/periodicals/cityscpe/vol18num3/ch1.pdf**

Feb-1 (Hannah Cooper)	
Pre-Lecture Videos	○ Three Videos
Class session	Administrative Data and Validity and Construct Validity ○ First hour: Construct validity, units of analysis, & time ○ Second Hour: Construct validity, instrumentation, and measuring "race" and "ethnicity" over time Third hour: discussion of the Collins paper on gentrification and overdose

Lab	Case Study: Applying and comparing different algorithms to assess overdoses
Readings	**More on Validity** Cook, T. D., & Campbell, D. T. (1979). Quasi-experimentation: Design and analysis issues for field settings. Boston, MA: Houghton Mifflin Company. Chapters 2 and 3 (Statistical Conclusion Validity and Internal Validity; Construct Validity and External Validity) **Measuring "Race" and "Ethnicity" in the US Census** Mezey, N. (2002). Erasure and Recognition: The Census Race and the National Imagination. *Nw. UL Rev.*, *97*, 1701. Prewitt, K. (2005). Racial classification in America: where do we go from here?. *Daedalus*, *134*(1), 5-17. Williams, D. R. (1999). The monitoring of racial/ethnic status in the USA: data quality issues. *Ethnicity & health*, *4*(3), 121-137. **More on Gentrification** Collins, A. B., Boyd, J., Mayer, S., Fowler, A., Kennedy, M. C., Bluthenthal, R. N., Kerr, T., & McNeil, R. (2019). Policing space in the overdose crisis: A rapid ethnographic study of the impact of law enforcement practices on the effectiveness of overdose prevention sites. *International Journal of Drug Policy*, *73*, 199–207. https://doi.org/10.1016/j.drugpo.2019.08.002 : https://www.sciencedirect.com/science/article/pii/S0955395919302361

Feb-8 (Hannah Cooper)	
Pre-Lecture Videos	○ One Video
Class session	Administrative Data and Validity: Linking data across databases to describe people, institutions, and places First hour: probability-based matching for individual-level data Second hour: Linking databases to describe places Third hour: Linking databases to estimate the size of hidden populations
Lab	• Case study: Capture/Recapture exercise

Readings	**Integrating data to describe places** Cooper, H. L., Linton, S., Kelley, M. E., Ross, Z., Wolfe, M. E., Chen, Y. T., ... & Semaan, S. (2016). Racialized risk environments in a large sample of people who inject drugs in the United States. *International Journal of Drug Policy*, *27*, 43-55. **Probabilistic Matching** Foster, I., Ghani, R., Jarmin, R. S., Kreuter, F., & Lane, J. (Eds.). (2016). *Big data and social science: A practical guide to methods and tools*. crc Press. Chapter 3: Record Linkage **Capture/Recapture Methods** Jouanjus, E., Pourcel, L., Saivin, S., Molinier, L., & Lapeyre-Mestre, M. (2012). Use of multiple sources and capture–recapture method to estimate the frequency of hospitalizations related to drug abuse. *Pharmacoepidemiology and drug safety*, *21*(7), 733-741. Hickman, M., Cox, S., Harvey, J., Howes, S., Farrell, M., Frischer, M., ... & Tilling, K. (1999). Estimating the prevalence of problem drug use in inner London: a discussion of three capture-recapture studies. *Addiction*, *94*(11), 1653-1662.

Module 2: Geospatial Data Analysis

In this module, students will be introduced to geospatial social epidemiology, spatially referenced data, geographic information systems, cartography, and spatial analysis relating to the public health of substance use. Students will learn concepts and computational tools for linking, managing, and analyzing geographically referenced data relating to substance use and associated local drivers.

Feb-15 (Hannah Cooper/Lance Waller)	
Class session	Theory of local influences on drug-related health outcomes • The Risk Environment Model • Maps and health • Neighborhoods and health
Lab	• Reading data into ArcGIS • Making a map in ArcGIS
Readings	○ Gorman DM, Gruenewald PJ, and Waller LA (2013) Linking places to problems: Geospatial theories of neighborhoods, alcohol and crime. *GeoJournal* **78**; 417-428.

Feb-22 (Lance Waller)	
Class Session	Cartography and communication • Effective display of geographic information • Communicating with maps • Ethical issues in analyzing geospatial data for drug-related research
Lab	• Layering and joining multiple data sets
Readings	○ Duncan DT, Regan SD, Chaix B (2018) Operationalizing neighborhood definitions in health research. In *Neighborhoods and Health, Second Edition*, Duncan and Kawachi (eds). New York: Oxford University Press, pp. 19-56.

March-1 (Lance Waller)	
Class Session	Maps and theories of substance use • Maps of administrative data • Maps of substance use • Scale, aggregation, and the modifiable areal unit problem
Lab	• Access to services: Buffering locations
Readings	○ Gruenewald P (2007) The spatial ecology of alcohol problems: niche theory and associative drinking. *Addiction* **102**, 870-878. ○ Gruenewald P. J., Freisthler B., Remer L., LaScala E. A., Treno A. (2006) Ecological models of alcohol outlets and violent assaults: crime potentials and geospatial analysis. *Addiction*; 101: 666– 77.

March-15 (Lance Waller)	
Class Session	Local risk and resiliency • Risk and resilience factors • Vulnerability indices Spatial regression
Lab	Case study work time
Readings	○ Duncan DR, Goedel WC, and Chunara R (2018) Quantitative methods for measuring neighborhood characteristics in neighborhood health research. In *Neighborhoods and Health, Second Edition*. Duncan and Kawachi (eds). New York: Oxford University Press, pp. 57-90. ○ Gruenewald P. J., Freisthler B., Remer L., LaScala E. A., Treno A. (2006) Ecological models of alcohol outlets and violent assaults: crime potentials and geospatial analysis. *Addiction*; 101: 666– 77.

March-22 (Lance Waller)	
Class Session	Geographic analysis • Building a geographic analysis • GIS for processing data R for analyzing data
Lab	Case study work time
Readings	○ Gruenewald PJ, Ponicki WR, Remer LG, Waller LA, Zhu L, and Gorman DM (2013) Mapping the spread of methamphetamine abuse in California from 1995 to 2008. *AJPH* **103**: 1262-1270. ○ Gruenewald P (2007) The spatial ecology of alcohol problems: niche theory and associative drinking. *Addiction* **102**, 870-878.

Module 3: Social Network Analysis

Interest in network analysis has exploded in the past few years, due to the advancements in statistical modeling and the rapid availability of network data. This course covers the major methods to collect, represent, and analyze network data. Selected topics include basic network analysis (centrality, positions, and clustering), the exponential random graph model for modeling network formations, causal analysis of network effects, the stochastic actor-oriented model for dynamic network analysis, and social network-based interventions. Students will learn hands-on skills to conduct their own research by using network packages in R such as "statnet" and "RSiena".

Recommended Textbooks

1. Wasserman, Stanley and Katherine L. Faust. 1994. Social Network Analysis: Methods and Applications. New York: Cambridge University Press.
2. Lusher, D., Koskinen, J. & Robins, G. 2013. Exponential Random Graph Models for Social Networks: Theory, Methods, and Applications. Cambridge University Press.
3. Valente, Thomas W. 2010. Social Networks and Health: Models, Methods, and Applications. Oxford University Press.

March-29 (Weihua An)	
Class Session	Introduction to Social Networks and Health
Lab	• Basic Analysis

Readings	Pescosolido, Bernice A. 2006. "Of Pride and Prejudice: The Role of Sociology and Social Networks in Integrating the Health Sciences." *Journal of Health and Social Behavior* 47(3): 189-208. Thoits, Peggy A. 2011. "Mechanisms Linking Social Ties and Support to Physical and Mental Health." *Journal of Health and Social Behavior* 52(2): 145-161. Valente, Thomas W., Peggy Gallaher, and Michele Mouttapa. 2004. "Using Social Networks to Understand and Prevent Substance Use: A Transdisciplinary Perspective." *Substance Use & Misuse* 39: 1685-1712. Brewer, Devon and Cynthia Webste. 1999. "Forgetting of Friends and its Effects on Measuring Friendship Networks." *Social Networks* 21: 361-373.

April-5 (Weihua An)	
Class Session	Random Network Models
Lab	ERGM
Readings	Wimmer, Andreas, and Kevin Lewis. 2010. "Beyond and Below Racial Homophily: ERG Models of a Friendship Network Documented on Facebook." *American Journal of Sociology* 116:583-642. Papachristos, Andrew V., David Hureau, and Anthony A. Braga. 2013. "The Corner and the Crew: The Influence of Geography and Social Networks on Gang Violence." *American Sociological Review* 78(3): 417-447.

April-12 (Weihua An)	
Class Session	Network Effects
Lab	Positional Analysis
Readings	An, Weihua. 2015. "Instrumental Variables Estimates of Peer Effects in Social Networks." *Social Science Research* 50: 382-394. Cornwell, Benjamin. 2009. "Good Health and the Bridging of Structural Holes." *Social Networks* 31:92- 103. Bearman, Peter S., James Moody and Katherine Stovel. 2004. "Chains of Affection: The Structure of Adolescent Romantic and Sexual Networks." *American Journal of Sociology* 110: 44-91.

April-19 (Weihua An)	
Class Session	Dynamic Network Analysis
Lab	SAOM
Readings	Christakis, Nicholas A. and James H. Fowler. 2007. "The Spread of Obesity in a Large Social Network Over 32 Years." *New England Journal of Medicine* 357(4): 370-379. Cohen-Cole, Ethan and Jason M. Fletcher. 2008. "Is Obesity Contagious? Social Networks vs. Environmental Factors in the Obesity Epidemic." *Journal of Health Economics* 27: 1382–1387. Steglich, Christian, Tom A.B. Snijders, and Michael Pearson. 2010. "Dynamic Networks and Behavior: Separating Selection from Influence." *Sociological Methodology* 40(1): 329-393.

April-26 (Weihua An)	
Class Session	Interventions and Ethical Issues
Lab	Network Interventions
Readings	Valente, Thomas W. 2012. "Network Interventions." *Science* 337: 49-53. Centola, Damon. 2011. "An Experimental Study of Homophily in the Adoption of Health Behavior." *Science* 334: 1269-1272. Paluck, E. L., H. Shepherd, and P. M. Aronow. 2016. "Changing Climates of Conflict: A Social Network Experiment in 56 Schools." *PNAS* 113(3): 566-571. An, Weihua. 2015. "Multilevel Meta Network Analysis with Application to Studying Network Dynamics of Network Interventions." *Social Networks* 43: 48-56.

ASSIGNMENTS

Assignment 1	TBA Due date: TBA. Completion points = (i.e., % of module)
Assignment 2	TBA Due date: TBA. Completion points = (i.e., % of module)

Assignment 3	For module 3, each student will select two readings from one section chosen by the student and prepare up to five slides for each reading to summarize the content and present 2-3 questions for class discussion. All students are expected to read the readings before class. Due date: Before class. Completion points = 10 points
Final Assignment	TBA Due date: TBA. Completion points = 2 (.e., % of module)