Reducing Drug-Related Harms Using Big Data:
Administrative and Geospatial Sources
Emory University
Spring 2025

Meeting room:	Grace Crum Rollins Bldg. Room GCR 513
Meeting times:	Wednesdays, 3:00pm – 5:30pm
Credit hours:	3
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 two types of "big data" (administrative and geospatial 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.

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': Machine Learning and AI Methods"). 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, and geospatial 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, and geospatial 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, and geospatial data.
2. Conduct theoretically guided analyses describing distributions and ecologies of SUD-related harms and services using appropriate data science methods for administrative data, and geospatial 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, and geospatial 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, and geospatial 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, and geospatial 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 O'Reily.

Textbook

- **There is no <u>required</u> 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 of the Emory College Online technology requirements. Click here for a PDF of the Emory College Online technology requirements.
- <u>Lecture slides will be made available to all students via Canvas</u>.
- 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.).
- <u>It is your responsibility to check this site regularly to stay up-to-date on announcements and assignments</u>.
- 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 circumstances require that we switch the course format to zoom meetings, students are required to be visually present during Zoom meetings. In such instances:
  - If you are comfortable, please turn the camera on your device 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 and help prevent zoombombing.
- Being engaged by asking questions and contributing to class discussions.

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 in advance of the 11:59 PM deadline.
  - If you foresee needing an extension, please reach out to the instructor teaching the current module ASAP.
  - Questions about assignments should be emailed to the professors, or asked in class.

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 outside of the classroom.

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 one of the course instructors via email. 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	25%
Final project – module 1	15%
Final project – module 2	15%
Laboratory Assignments	30%
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-15	Course Introduction	Cooper
	Jan-22	Orientations to select illegalized substances administrative data, and external validity	Cooper/O'Reilly
	Jan-29	Construct validity, data justice, and community engagement	Cooper/O'Reilly
	Feb-5	Validity, race, and the US Census	Cooper/O'Reilly/Waller
	Feb-12	Ascertaining overdose in hospital data	Cooper/O'Reilly/ Guest: Vivolo-Kantor
	Feb-19	Validity and TEDS Data	Cooper/O'Reilly/ Guest: Das
	Feb-26	Ethics, regulatory issues, and sensitive administrative data	Cooper/O'Reilly/ Guest: Das
	Mar-5	Student presentations Administrative data wrap up	Cooper
MODULE 2: GEOSPATIAL DATA ANALYSIS	Mar-10-14	NO CLASS - Spring Break	
	Mar-19	Cartography and Communication	Waller
	Mar-26	Maps and Theories of Substance Use, Local Social Determinants of Health	Waller
	Apr-2	Census Data at the Small Area Level	Waller
	Apr-9	Local risk and resiliency: Indexing indices	Waller
	Apr-16	Data ethics in space	Waller
	Apr-23	Pulling it all together: Geographic analyses start to finish	Waller

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.

Class 1: Jan-15 (Hannah Cooper/Lance Waller/Rob O'Reilly)

Introduction to the course

Class session	o **First two hours:** Course overview and rationale o **Last 30 mins:** Epidemiology and consequences of illegalized drug use
Lab	Introduction to the Module I lab
Readings	****OPTIONAL** 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.Links to an external site. 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.2021.0967Links to an external site. **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/Links to an external site. 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/Links to an external site.

Class 2: Jan-22 (Hannah Cooper/Rob O'Reilly)	
Orientations to select illegalized substances administrative data, and external validity	

Class session	o **First Part:**
	  ▪ Illegalized drugs overview (Hannah)
	  ▪ Administrative data overview (Hannah)
	o **Second Part:**
	  ▪ Validity overview
	  ▪ Case study: External validity & US census coverage
	  ▪ Student led discussion: Police violence
	o **Third Part:** Lab (Rob)

Lab	Importing and Checking Data

Readings	**Administrative data overview:**
	
	o 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.
	
	Validity, External Validity, and Application of External Validity to Census Coverage:
	
	(1) Orientation to Validity: Cook and Campbell reading, pages 37-39 in the PDF Cook_1 validity intro (ignore the rest of this PDF for now)
	
	(2) External validity: Cook and Campbell reading, pages 70-81 in the external validity PDF (ignore the rest of the PDF for now)
	(3) Census coverage readings
	    a. Census analysis of the undercount
	    b. Urban league analysis
	    c. National urban league piece
	Student-led paper discussion
	
	(1) Police violence readings – read this carefully, in preparation for the student-led discussion. How is this drug-related, you might ask? Because so many "war on drugs" police tactics generate police violence
	    a. Feldman and Bassett paper
	    b. Comer paper
	
	Optional Readings (for labs):
	
	o Broman, Karl W. & Kara H. Woo (2018) Data Organization in Spreadsheets. The American Statistician, 72(1), 2-10. https://doi.org/10.1080/00031305.2017.1375989.
	o Wickham, Hadley (2014). Tidy Data. Journal of Statistical Software, 59(10), 1–23. https://doi.org/10.18637/jss.v059.i10.

Class 3: Jan-29 (Hannah Cooper/Rob O'Reilly) *Construct validity, data justice, and community engagement*	
Class session	o **First Part:** • **Construct validity** • **Student presentation: hospital discharge data and SUD in pregnancy** o **Second Part:** **Data justice and community engagement** o **Third Part: Lab (Rob)**
Lab	Checking Data, Variable Creation and Transformation
Reading	**Construct validity:** o Cook and Campbell pages 59-70 **Data justice** o Lina Dencik, Arne Hintz, Joanna Redden & Emiliano Treré (2019) Exploring Data Justice: Conceptions, Applications and Directions, Information, Communication & Society, 22:7, 873-881, DOI: 10.1080/1369118X.2019.1606268 o Redden, J. (2018). Democratic governance in an age of datafication: Lessons from mapping government discourses and practices. Big Data & Society, 5(2), 2053951718809145. **Community engagement:** o Perri, M., Khorasheh, T., Poon, D. E. O., Kaminski, N., LeBlanc, S., Mizon, L., ... & Leece, P. (2023). A rapid review of current engagement strategies with people who use drugs in monitoring and reporting on substance use-related harms. Harm Reduction Journal, 20(1), 169. **Article for student-led discussion:** o Admon, L. K., Bart, G., Kozhimannil, K. B., Richardson, C. R., Dalton, V. K., & Winkelman, T. N. (2019). Amphetamine-and opioid-affected births: incidence, outcomes, and costs, United States, 2004–2015. American journal of public health, 109(1), 148-154. https://pmc.ncbi.nlm.nih.gov/articles/PMC6301406/pdf/AJPH.2018.304771.pdf

Class 4: Feb-5 (Hannah Cooper/Rob O'Reilly/Lance Waller)	
Validity, race, and the US Census	
Class session	o **First Part: Evolving census constructions of race/ethnicity** o **Second Part: Student-led discussion: Bridging methods for changing race/ethnicity classifications in the census** o **Third Part: Lab (Rob)**
Lab	Dataset Transformation: Ordering/Sorting, Filtering, Merging/Joining
Readings	**Measuring "Race" and "Ethnicity" in the US Census** o Mezey, N. (2002). Erasure and Recognition: The Census Race and the National Imagination. *Nw. UL Rev., 97*, 1701. o Prewitt, K. (2005). Racial classification in America: where do we go from here?. *Daedalus, 134*(1), 5-17. o Williams, D. R. (1999). The monitoring of racial/ethnic status in the USA: data quality issues. *Ethnicity & health, 4*(3), 121-137. **U.S. Office of Management and Budget (OMB) 2024 Revisions to Statistical Policy Directive No. 15: Standards for Maintaining, Collecting, and Presenting Federal Data on Race and Ethnicity** **U.S. Office of Management and Budget (OMB) 2024 Revisions** • **March 28, 2024: OMB Publishes Revisions to Statistical Policy Directive No. 15: Standards for Maintaining, Collecting, and Presenting Federal Data on Race and Ethnicity | OMB | The White House** **U.S. Census Bureau Implementation of OMB Revisions** • **April 8, 2024 Overview: Impact on What Updates to OMB's Race/Ethnicity Standards Mean for the Census Bureau** https://www.census.gov/newsroom/blogs/random-samplings/2024/04/updates-race-ethnicity-standards.html • **April 8, 2024 Census Director's Summary: Meeting Our Future: Improving Race/Ethnicity Data With Updated Federal Standards** **https://www.census.gov/newsroom/blogs/director/2024/04/improving-race-ethnicity-data.html** • **Census.gov recent blog discussions on updates to Race/Ethnicity Standards:** https://www.census.gov/topics/population/racial-ethnic-diversity/newsroom/blogs.html **Article for Student-led discussion:** **Bridging changing census measures of race/ethnicity over time. Read highlighted text in the PDF " DocumentationBridgedPostCen" document** **Optional:** • **Full details regarding OMB's Revisions, from the Federal Register:** https://www.federalregister.gov/documents/2024/03/29/2024-06469/revisions-to-ombs-statistical-policy-directive-no-15-standards-for-maintaining-collecting-and
Class 5: Feb-12 (Hannah Cooper/Rob O'Reilly/Guest: Alana Vivolo-Kantor**)**	
Ascertaining overdose in hospital data	

Class session	**First part:** • Dr. Alana Vivolo-Kantor on Overdose ascertainment in hospital discharge data **Second part:** • Internal validity and overdose ascertainment • Student-led discussion **Third Part:** Lab (Rob)
Lab	• Dataset Transformation: Aggregating Data, Pivoting Data, Comparing Datasets
Readings	**Internal Validity** Cook, T. D., & Campbell, D. T. (1979). Quasi-experimentation: Design and analysis issues for field settings. Boston, MA: Houghton Mifflin Company. Chapter 2 , page 50-59 **Overdose ascertainment in death records** Slavova, S., O'Brien, D. B., Creppage, K., Dao, D., Fondario, A., Haile, E., ... & Council of State and Territorial Epidemiologists Overdose Subcommittee. (2015). Drug overdose deaths: let's get specific. *Public health reports, 130*(4), 339-342. Noymer A, Penner AM, Saperstein A. Cause of death affects racial classification on death certificates. *PLoS One.* 2011;6(1):e15812. **Student-led discussion** Vivolo-Kantor, A., Pasalic, E., Liu, S., Martinez, P. D., & Gladden, R. M. (2021). Defining indicators for drug overdose emergency department visits and hospitalisations in ICD-10-CM coded discharge data. *Injury prevention, 27*(Suppl 1), i56-i61.

	Class 6: Feb-19 (Hannah Cooper/Rob O'Reilly/Guest: Suparna Das)
	Validity and TEDS data

Class session	**First Part:**
	  Dr. Suparna Das (SAMHSA) on TEDS
	
	Second Part:
	  o Student-led discussion of TEDS paper
	  o Theory and Statistical conclusion validity
	
	Third Part: Lab (Rob)

Lab	• Odds and Ends, Creating Codebooks and Metadata, Replication Assignment Overview
Readings	**Theory and Statistical Conclusion Validity** Krieger, N. (2011). *Epidemiology and the people's health: theory and context.* Oxford University Press. Chapter 1 (pgs 3-42). Alcoff, L. M. (2007). Epistemologies of ignorance: Three types. In S. Sullivan & N. Tuana (Eds.), Race and epistemologies of ignorance (pp. 39-57). State University of New York. Wagenaar, A. C., & Burris, S. C. (Eds.). (2013). *Public health law research: theory and methods.* John Wiley & Sons. Chapter 3. Cook, T. D., & Campbell, D. T. (1979). Quasi-experimentation: Design and analysis issues for field settings. Boston, MA: Houghton Mifflin Company. Chapter 3: Statistical Conclusion Validity on pages 39-44 **Deep Dive into TEDS** Substance Abuse and Mental Health Services Administration: Treatment Episode Data Set (TEDS) 2022: Admissions to and Discharges from Substance Use Treatment Services Reported by Single State Agencies. Publication No. PEP 24-07-023 MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, 2024. *PAY CLOSE ATTENTION TO THE METHODS SECTION AND APPENDIX J (on methods)* **Student-led discussion:** Khan, M. T. F., Mazumder, S., & Rao, M. (2024). The trend of characteristics and pattern of polysubstance co-occurrences among pregnant women: TEDS-A findings. *Journal of Substance Use, 29*(5), 657-664. **Optional:** Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. Combined Substance Use and Mental Health Treatment Episode Data Set (TEDS) State Instruction Manual—Version 5.0, with Data Submission System (DSS) Guide. Rockville, MD: SAMHSA, 2022.

	Class 7: Feb-26 (Hannah Cooper/Rob O'Reilly/ Guest: Melissa Hall)
	Ethics, regulatory issues, and sensitive administrative data
Class session	First Part: • Ethics and DUAs o Guest: Melissa Hall (Emory) • Ethics vignettes **Second Part:** Lab (Rob)
Lab	• Census and Sensibility: An Overview of Census Bureau Data and Tools for Accessing Them
Readings	**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. **Student-led paper** Evans, E. A., Delorme, E., Cyr, K., & Goldstein, D. M. (2020). A qualitative study of big data and the opioid epidemic: recommendations for data governance. *BMC Medical Ethics, 21*, 1-13.

	Class 8: Mar-05 (Hannah Cooper)
	Admin Data Wrap up
Class session	• Student Presentations Administrative Module Wrap up
Readings	No readings – prep for presentation

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.

Class 9: Mar-19 (Lance Waller)	
Cartography and communication	
Class Session	• Effective display of geographic information • Communicating with maps • Census geography • Scale, aggregation, and the modifiable areal unit problem
Lab	• Making a map in R • Reading census data into R through the tidycensus API • Mapping Census Data • Starting a markdown file
Readings	• **Read:** 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. • Resource: Kyle Walker's *Analyzing US Census Data: Methods, Maps, and Models in R*, a book published with CRC Press in 2023. https://walker-data.com/census-r/index.html • **Read:** Chapter 6: https://walker-data.com/census-r/mapping-census-data-with-r.html

Class 10: Mar-26 (Lance Waller)	
Maps and Theories of Substance Use	
Class Session	• Maps and Theories of Substance Use, Local Social Determinants of Health, EJScreen neighborhood reports • Spatial equity, environmental justice • Spatial clusters
Lab	• Maps of administrative data • Maps of substance use • Building a portfolio Rmarkdown file
Readings	o Gruenewald P (2007) The spatial ecology of alcohol problems: niche theory and associative drinking. *Addiction* **102**, 870-878. o 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.

Class 11: Apr-2 (Lance Waller)	
Census Data at the Small Area Level	
Class Session	• Introduction to Corrigan et al. (2021)
Lab	• Mapping and graphing small area census summaries. • Mapping and graphing the elements of Corrigan et al's gentrification index.
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. ○ Corrigan et al. (2021) Characterizing clusters of gentrification in metro Atlanta, 2000-2016. *Applied Geography* 102597.

Class 12: Apr-9 (Lance Waller)	
Local risk and resiliency: Indexing indices	
Class Session	Local risk and resiliency: Indexing indices
Lab	• Mapping the social vulnerability index • Calculating a gentrification index
Readings	○ Corrigan et al. (2021) Characterizing clusters of gentrification in metro Atlanta, 2000-2016. *Applied Geography* 102597.

Class 13: Apr-16 (Lance Waller)	
Data Ethics in Space	
Class Session	• Ethical issues in analyzing geospatial data • Ethical issues in analyzing geospatial data for drug-related research • Privacy and confidentiality • Privacy and confidentiality in space • Differential privacy
Lab	• "Privacy audit" of geospatial labs so far
Readings	• "Your apps know where you were last night, and they're not keeping it secret". NY Times, December 10, 2018 https://www.nytimes.com/interactive/2018/12/10/business/location-data-privacy-apps.html • Hartter, Joel, et al. "Spatially explicit data: stewardship and ethical challenges in science." *PLoS Biology* 11.9 (2013): e1001634.https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001634

	Class 14: Apr-23 (Lance Waller)
	Pulling it all together: Geographic analyses start to finish (to Start Again)
Class Session	- Geographic analyses and reporting - Walk-through of Corrigan et al (2021) - Building a geographic analysis - GIS for processing data - R for analyzing data - Communicating with code and maps
Lab	Case study work time
Readings	No additional readings.

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