TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	URSC 645 Urban and Regional Analytics
Term	SPRING 2023
Meeting times and location	Tuesday & Thursday 2:20 – 3:35 ARCA 302

Course Description and Prerequisites

Course catalog description: Urban and regional administrative data management; data analysis; programming for replicable, systematic research; project workflow to support project collaboration

Course Purpose: The purpose of this course is to apply urban analytics tools, such as tools for data management and visualization, to publicly available data that relate to development, structure, and functioning of urban and regional environments. The course introduces data workflow skills to obtain, scrub, explore, visualize, interpret and publish data.
The course focuses on computer coding skills to ensure that research is replicable, systematic and generalizable.
This course will familiarize Urban and Regional Science and Sociology PhD students with data management concepts for reproducible research. Computer coding or scripting is the basis for a data science workflow that leads to systematic research that can be replicated and generalized. Reproducible research means that results can be validated by other researchers, when provided with the data and software code used to generate the published results. This course will guide students through the challenges associated with reproducible research.

Prerequisites: Doctoral classification or approval of instructor.

Learning Outcomes

By the end of this class, students will be able to:

- Demonstrate that they understand basic applications for code and scripts.
- Adopt a scalable workflow for individual and team-based projects.
- Identify replicable research in sociology or urban and regional science journals.
- Use appropriate software to obtain, scrub, explore, visualize, interpret and publish data.

Instructor Information

Name	Nathanael P. Rosenheim, PhD
Telephone number	979-969-2125 (call or text)
Email address	nrosenheim@arch.tamu.edu
Office hours	Tuesday 10:30 AM – 12:30 AM
Office location	Scoates 117 or Zoom Meeting Room (https://tamu.zoom.us/my/nrosenheim)
Course GitHub Repository	https://github.com/npr99/URSC645

Course Motivations

In the typical statistics course students work with clean, orderly datasets. However, when students begin to do their own research they are faced with real-world-raw data that is far from clean and orderly. Often, the process of generating a clean dataset requires a large time investment and for many projects this data cleaning process can take more time than the data modeling and interpretation. This course was motivated in part by seeing students struggle with real world data.
For many graduate students in the fields of sociology and urban and regional science, coding, scripting, and visualization tools are not introduced in undergraduate programs. However, many students and faculty discover that coding skills are essential for systematic, generalizable, and replicable research. This course attempts to provide the motivation and the foundation for building a strong workflow to support urban and regional analytic research.

Textbook and/or Resource Material

Required Reading:
Physical copy required:

Long, J. S. (2009). *The workflow of data analysis using Stata*. College Station, TX: Stata Press. https://www.stata.com/bookstore/workflow-data-analysis-stata/

Electronic copies available:

Munafò, M. R., Nosek, B. A., Bishop, D. V., Button, K. S., Chambers, C. D., du Sert, N. P., Simonsohn, U., Wagenmakers, E., Ware, J.J., & Ioannidis, J. P. (2017). A manifesto for reproducible science. *Nature Human Behaviour*, *1*, 0021. https://doi.org/10.1038/s41562-016-0021

Lowndes, J. S. S., Best, B. D., Scarborough, C., Afflerbach, J. C., Frazier, M. R., O'Hara, C. C., Jiang, N., & Halpern, B. S. (2017). Our path to better science in less time using open data science tools. *Nature ecology & evolution*, *1*(6), 160. https://doi.org/10.1038/s41559-017-0160

Freese, J. (2007). Replication standards for quantitative social science: Why not Sociology?. *Sociological Methods & Research*, *36*(2), 153-172. https://doi.org/10.1177/0049124107306659

Arribas-Bel, D., de Graaff, T., & Rey, S. J. (2017). Looking at John Snow's Cholera Map from the Twenty First Century: A Practical Primer on Reproducibility and Open Science. In *Regional Research Frontiers-Vol. 2* (pp. 283-306). Springer International Publishing. https://doi.org/10.1007/978-3-319-50590-9_17

Gentzkow, M., & Shapiro, J. M. (2014). Code and data for the social sciences: A practitioner's guide. *University of Chicago mimeo.* http://home.bi.no/charlotte.ostergaard/students/CodeAndData.pdf

The Turing Way Community, Becky Arnold, Louise Bowler, Sarah Gibson, Patricia Herterich, Rosie Higman, … Kirstie Whitaker. (2021, Nov 10). *The Turing Way: A Handbook for Reproducible Data Science (Version v1.0.1)*. Zenodo. http://doi.org/10.5281/zenodo.5671094 Ebook link: https://the-turing-way.netlify.app/welcome

Additional Reading Resources:

Sheather, S. (2008). A Modern Approach to Regression with R. http://doi.org/10.1007/978-0-387-09608-7
Source code in SAS, Stata, and R: http://gattonweb.uky.edu/sheather/book/

Motivating Data Publication Examples:

Roy, Malini; Rosenheim, Nathanael (2021) *"Longitudinal Social Vulnerability Data Exploration for Harris County Census Tracts*." DesignSafe-CI. https://doi.org/10.17603/ds2-hn6r-dh03.

Rosenheim, Nathanael; Day, Wayne; Seong, Kijin (2021) "*Automated Neighborhood Characteristics for Community Resilience Planning*." DesignSafe-CI. https://doi.org/10.17603/ds2-hj0p-bp40.

Rosenheim, N. Peacock, W. Williams, A. Lane, G. Watson, M. Sullivan, E. Katare, A. Kastor, H. (2021) "Report of Applied Methods", in *Food Access Impact Survey for Harris County and Southeast Texas after Hurricane Harvey in 2017.* DesignSafe-CI. https://doi.org/10.17603/ds2-dh61-m731.

Rosenheim, Nathanael (2021) "*Detailed Household and Housing Unit Characteristics: Data and Replication Code.*" DesignSafe-CI. https://doi.org/10.17603/ds2-jwf6-s535.

Additional readings will be made available through Google Drive.

LinkedInLearning Course Work

Free resources for TAMU students, staff, and faculty (https://linkedinlearning.tamu.edu/)

Vijayan, Lavanya. (2019). Python Quick Start. https://www.linkedin.com/learning/python-quick-start/

Davis, Annyce. (2020). Programming Foundations: Fundamentals. https://www.linkedin.com/learning/programming-foundations-fundamentals-3/

Buscha, Franz. (2019). Introduction to Stata 15. https://www.linkedin.com/learning/introduction-to-stata-15/

Grading Scale

Final course grades will be awarded on a 100 percent scale.
A=89.5-100 B=79.5-89.49 C=69.5-79.49 D=60-69.49 F=<60

Grades will be awarded on the basis of the following percentages:

- In-class discussions = 10%
- Code Foundations = 10%
- 2 Annotated Bibliography Contributions = 10% (5% each)
- Assignment 1 = 15%
- Assignment 2 = 15%
- Assignment 3 = 15%
- Final assignment = 25%

Major Assignment Dates, Course Topics, Calendar of Activities

Summary of Major Assignments

Code Foundations: Students will work to replicate and follow a LinkedInLearning Course (see above list). Students will share their work logs and lead a class discussion on lessons learned.
Annotated Bibliography Contribution: Contribute to and edit the Course Annotated Bibliography
Assignment 1: Project folder structure with readme file that introduces problem, research questions, unit of analysis, and relevant data
Assignment 2: Script with data cleaning process, clean data file, and codebook
Assignment 3: Script with data exploration, visualization, and automated output files
Final assignment: Updated versions of Assignments 1, 2, and 3. The final assignment will be a sharable (published) project that can be easily replicated by other members of the class.
Each assignment will include an updated version of previous assignment(s) as well as source datasets and code required to replicate workflow steps.

Week	Topic	Required Reading
1 – Jan 17	Course Introduction	
2 – Jan 24	Introduction to workflow and reproducible research	Long 2009 Ch 1-2; Munafò et al, 2017; Lowndes et al 2017; Freese 2007; Gentzkow and Shapiro 2014 Ch 1-2
Jan 31	Code Foundations Due by 9am	
3 – Jan 31	Code Foundations Coding basics: Reading in data	Long 2009 Ch 3-5; Gentzkow and Shapiro 2014 Ch 3-5
4 – Feb 8	Challenges to Collaboration and Reproducible Research, Motivating Example	Long 2009 Ch 6; Gentzkow and Shapiro 2014 Ch 6-Appendix,
Feb 8	Annotated Bibliography Contributions	
5 – Feb 14	Coding basics: Variables and equations	
6 – Feb 22	Coding basics: Loops and functions	Review Long 2009 Ch 3-4; Review Gentzkow and Shapiro 2014
7 – Feb 28	Obtain Data	Review Long 2009 Ch 5-6
Feb 28	Assignment 1 Due by 9am	
8 – Mar 7	Review of replicable research in sociology or urban and regional science journals	
Mar 14	Spring Break	
9 – Mar 21	Scrub Data	Review Long 2009 Ch 5-6
10 – Mar 28	Scrub Data	Review Long 2009 Ch 5-6
Mar 28	Assignment 2 Due by 9am	
11 – Apr 4	Explore Data	
12 – Apr 11	Explore & Visualize Data	Review Long 2009 Ch 7
Apr 11	Assignment 3 Due by 9am	
13 – Apr 18	Explore & Visualize Data	
14 – Apr 25	Publish Final Projects within class	
May 2	Replication challenge	
May 9	Final Assignment Due	

University Policies

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).
You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact the Disability Resources office on your campus (resources listed below) Disabilities may include, but are not limited to attentional, learning, mental health,

sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Disability Resources is located in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in healthy self-care by utilizing available resources and services on your campus

Students who need someone to talk to can contact Counseling & Psychological Services (CAPS) or call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.