



Course title and number URSC 689 Urban and Regional Analytics
Term SPRING 2021
Meeting times and location Monday 9:20 – 11:50 ONLINE

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 of 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

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Office hours Monday 1:00 PM – 3:00 PM
Office location Zoom Meeting Room (<https://tamu.zoom.us/my/nrosenheim>)

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.

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. [10.1007/978-3-319-50590-9_17](https://doi.org/10.1007/978-3-319-50590-9_17) <http://www.regscience.hu:88/record/373/files/978-3-319-50590-9.pdf#page=285>

Gentzkow, M., & Shapiro, J. M. (2014). Code and data for the social sciences: A practitioner's guide. *University of Chicago mimeo*.
<https://people.stanford.edu/gentzkow/sites/default/files/codeanddata.pdf>

Additional Reading Resources:

Sheather, S. (2008). A Modern Approach to Regression with R. <https://doi-org.lib-ezproxy.tamu.edu:9443/10.1007/978-0-387-09608-7>

Source code in SAS, Stata, and R: <http://gatttonweb.uky.edu/sheather/book/>

Motivating Data Publication Examples:

Rosenheim, N. (2020). *Population Pyramid Data and R Script for the US, States, and Counties 1970 - 2017*. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2020-01-06. <https://doi.org/10.3886/E117081V2>

Gu, D., and Rosenheim, N. (2020). *Demographic Analysis Workflow using Census API in Jupyter Notebook: 1990-2000 Population Size and Change*. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2020-07-30. <https://doi.org/10.3886/E120381V1>

Rosenheim, N, Stanley, M., Goodman, C., Berd, A., Hayes, S., Millard, E., Korukonda, J., Watson, M. (2020). *Systematic Literature Review Toolkit*. DesignSafe-Cl. <https://doi.org/10.17603/ds2-3fn5-4b44>.

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%

Team Code Foundations 1 = 15%

Team Code Foundations 2 = 15%

Assignment 1 = 10%

Assignment 2 = 15%

Assignment 3 = 15%

Final assignment = 20%

Major Assignment Dates, Course Topics, Calendar of Activities

Summary of Major Assignments

Team Code Foundations 1: 2-4 Students will work together to replicate and follow a LinkedInLearning Course (see above list). Teams will share their work logs and lead a class discussion on lessons learned and demonstrate how they applied a basic coding and scripting skill.

Team Code Foundations 2: 2-4 Students will work together to replicate and follow a chapter from Scott Long (2009). Teams will share their work logs and lead a class discussion on lessons learned and demonstrate how they applied a basic coding and scripting skill.

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 25	Course Introduction	
2 – Feb 1	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
3 – Feb 8	Teams 1 & 2 Code Foundations 1 Coding basics: Reading in data	Long 2009 Ch 3-5; Gentzkow and Shapiro 2014 Ch 3-5
4 – Feb 15	Teams 3 & 4 Code Foundations 1 Coding basics: Variables and equations	Long 2009 Ch 6; Gentzkow and Shapiro 2014 Ch 6-Appendix, Census SIAPE Program , SAHIE Program , Community Resilience Estimates
5 – Feb 22	Teams 1 & 2 Code Foundations 2 Coding basics: Loops and functions	Review Long 2009 Ch 3-4; Review Gentzkow and Shapiro 2014
6 – Mar 1	Teams 3 & 4 Code Foundations 2 Obtain Data	Review Long 2009 Ch 5-6
7 – Mar 8	Scrub Data	Review Long 2009 Ch 5-6
7 – Mar 10	Assignment 1 Due by 9am	
8 – Mar 15	Spring Break	
9 – Mar 22	Scrub Data	Review Long 2009 Ch 5-6
10 – Mar 29	Explore Data	
10 – Mar 31	Assignment 2 Due by 9am	
11 – Apr 5	Explore & Visualize Data	Review Long 2009 Ch 7
12 – Apr 12	Data Quality Control – Update Scrub Data	
13 – Apr 19	Model data	Review Long 2009 Ch 7
13 – Apr 21	Assignment 3 Due by 9am	
14 – Apr 26	Publish Final Projects within class	
May 7		Final Assignment Due

Attendance and Make-Up/Late Work Policies

Late Work: With prior notification and an acceptable excuse (at instructor discretion), assignments may be turned in late. Assignments may be assessed a 10% penalty per 24-hour period beyond the deadline.

Attendance: 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.)

Americans with Disabilities Act (ADA)

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 Disability Resources in the Student Services Building or at (979) 845-1637 or visit <http://disability.tamu.edu>. 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.

Academic Integrity Statement and Policy:

Aggie Honor Code

"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.

Title IX

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, you 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 proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can 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.

COVID-19 Temporary Addendum to Minimum Syllabus Requirements

The Faculty Senate temporarily added the following statements to the minimum syllabus requirements in Spring 2021 as part of the university's COVID-19 response.

Campus Safety Measures

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the Spring 2021 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring—Students should follow CDC recommendations for self-monitoring. **Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely if that option is available, and should not participate in face-to-face instruction.**
- Face Coverings—[Face coverings](#) (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of face coverings and additional guidance are provided in the [Face Covering policy](#) and [Frequently Asked Questions \(FAQ\)](#) available on the [Provost website](#).
- Physical Distancing—Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students must properly wear an approved face covering. If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the [Student Conduct office](#) for sanctions. Additionally, the faculty member may choose to teach that day's class remotely for all students, or dismiss the class in the case of a traditional face to face lecture.

Personal Illness and Quarantine

Students required to quarantine must participate in courses and course-related activities remotely, if that option is available, and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or illness that is too severe for the student to attend class qualify for an excused absence (See [Student Rule 7, Section 7.2.2.](#)) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7.

