CRD 150 – Quantitative Methods in Community Research (Winter 2024)
Department of Human Ecology - University of California, Davis
Lecture: Monday & Wednesday 10:00-11:50 am, 204 Art
Labs: Friday, 2216 Teaching and Learning Complex
A01: 10:00-10:50; A02: 11:00-11:50

Instructor: Dr. Noli Brazil
Office: 2325 Hart Hall
Email: nbrazil@ucdavis.edu
Office Hours: Monday & Wednesday: 4:00-5:00 pm or by appointment.
Zoom or in-person. Check Canvas for Zoom link.

Sign up here: https://www.wejoinin.com/sheets/vwzry. Out of courtesy to other students, please do not sign up for more than two 10-minute blocks. If you do, I will keep only the first two blocks. The last 20 minutes are open drop in.

Graduate Instructor: Jennifer Cribbs jecribbs@ucdavis.edu
Office: Plant and Environmental Sciences 2004
Office Hours: Tuesday, 2:00-4:00 pm

Lab Website: https://crd150.github.io/index.html

Course Overview

Data are everywhere. Data are no longer just collected by means of traditional surveys and questionnaires, but through simple acts like biking and looking at your phone. Communities are now relying more and more on traditional and new forms of data to address social problems and policy issues such as crime, displacement, and poverty. This course is an introduction to the use of statistical methods and tools to uncover, understand and conceptualize patterns in data. The empirical and theoretical emphasis will be on the community; that is, the class will give you the methodological skills to use data to better describe communities and examine community-level phenomena. You will work with both nonspatial and spatial data from traditional (e.g. U.S. Census) and nontraditional sources (e.g. open data portals). Specific topics covered include data acquisition, management, and presentation (graphs, tables, maps), descriptive analysis (measuring segregation, spatial clustering), citizen science and participatory mapping, and measuring place-based inequalities. Lectures will present abstract statistical concepts alongside data analysis examples motivated through real-world problems. Labs will provide hands-on practice of the methods covered in lecture using the statistical software program R.

Course Prerequisites

SOC 46B, STA 13, or STA 32. Experience with a statistical software package is useful but not required.

Course Objectives

In this course, students will gain:

- A foundation in critical thinking and reasoning skills based on data.
- Skills in acquiring data from a wide range of reliable public and private sources.
- An understanding of the differences between spatial and nonspatial data.
- Skills in data cleaning and management .
- An understanding of how to appropriately present nonspatial data in tables and graphs and spatial data in maps.
- Skills in descriptive analysis of nonspatial and spatial data.
- Proficiency in data analytic tools, specifically R.
- An understanding of how these methods are employed in examining communities.

Course Format

The course is organized into two phases. A detailed outline of the course is provided in the section Course Agenda.

- Part 1: Analyzing communities using nonspatial data. Topics include descriptive statistics, exploratory data analysis, data presentation, and visualization. As the major source of nationwide community-level data in the United States, the U.S. Census will be covered extensively.

- Part 2: Analyzing communities using spatial data. Topics include big data, government open data, point pattern analysis, spatial clustering, residential segregation, and story mapping.

Lecture Format

All lectures will be in person. Most Monday lectures will be a combination of lecture and ungraded in-class exercises/questions covering the week's substantive topics. The exercises during lecture are meant to be less about learning how to do a task in R, and more about deepening your understanding of the week's substantive topics. Expect that many of these exercises and questions be reflective of those found in the quizzes. Most Wednesday lectures will be a combination of some lecture covering the week's topic but mostly computer sessions covering the week's lab guide, which will be released on the course website every Wednesday morning. I will ask you to bring your laptops to Wednesday lectures in order to follow along. The lab guides provide hands on practice using real data. They will provide step-by-step instructions on executing specific tasks using a software program. Although you do not need to turn in lab guides for a grade, it is expected that you will go through each guide and master its contents. Not all lectures are expected to go the full class period. Monday lectures will not be recorded. Wednesday lectures will be recorded and posted on Canvas.

Lab Format

All labs will be in person. The TA will cover lab guide material that we were not able to get to during the Wednesday lecture computer sessions. They will also provide additional guidance on higher level points and provide more refined assignment feedback and help.

Course Readings

All required reading material will be posted on Canvas. It is composed of a combination of the following:

1. My handouts

   For most topics, in lieu of an article or book chapter, I will provide lecture handouts in advance of the assigned class.

2. Journal articles and research reports.

The other major course material are lab guides, which will be released before the Wednesday lecture. Many of the R lab guides will closely follow two textbooks. These textbooks are not required, but are great resources.

The first textbook covers the first part of the course (nonspatial data)

- (*RDS*) Wickham, Hadley & Garret Grolemund. (2017). R for Data Science. Sebastopol, CA: O'Reilly Media.

The textbook is free online at: http://r4ds.had.co.nz/introduction.html

The second textbook covers the second part of the course (spatial data)

- (*GWR*) Lovelace, Robin, Jakub Nowosad & Jannes Muenchow. (2019) Geocomputation with R. CRC Press.

The textbook is free online at: https://geocompr.robinlovelace.net/

Course Software

You will learn computer programming while you are learning statistics. I will not ask you to be a computer. You will however have to master the concepts behind the computation, and you'll have to learn how to "speak" a programming language. My aim as the instructor is to teach you to think computationally; to give you the ability to conceptualize statistical problems and exploit computers to solve them.

R is the only statistical language used in this course, as it has become an increasingly popular program for data analysis in the social sciences. R is freeware and you can download it on your personal laptop and desktop computers (along with RStudio, which is a user friendly interface for R). R has a steep learning curve, which will require you to fully engage with the material in order to get the most out of the class. We will also use ArcGIS Online later in the quarter.

Course Requirements

Students are expected to complete the following course requirements:

Assignments	50%
Quizzes (2)	20%
Final course project	30%
Total	100%

Assignments

Assignments will be released on the lab website Wednesday morning and will be due the following Wednesday morning on Canvas. Assignment questions are located at the end of each lab guide. They will contain a combination of programming tasks and theoretical questions that you will need to answer on your own. For each assignment, you will need to submit an R Markdown Rmd and html file on Canvas. Complete assignment guidelines can be found here: https://crd150.github.io/hw_guidelines.html.

In order to get full credit for each assignment, you will need to

1. Show the correct statistical results for a given question (e.g. map, table, statistics).
2. Show the code producing the results.
3. Provide comments in your own words explaining what each line of code is doing.
4. Provide correct written answers.
5. Submit an R Markdown Rmd file and its knitted html file on Canvas.

Note that assignments will get progressively harder, so it is important that you master the material each week as assignments will build on one another. If you get stuck you can seek help from the TA, who will be available in the scheduled lab sessions and during office hours. We also encourage you to work with other students, but you must submit your own assignment. Our grading will be more lenient at the beginning of the quarter as you learn the nuances of R, but will get progressively more stringent on aspects of your submission that have already been covered in prior assignments.

Late submissions will be deducted 10% per 24 hours until 72 hours after the submission due time. *After 72 hours your submission will not be graded. No exception unless you provide documentation of your illness or bereavement before the due date.* If you cannot upload the assignment on Canvas due to technical issues, you must email it as an attachment to the TA by the submission due time.

Quizzes

There will be two quizzes that will test conceptual material covered in lecture and readings. The quizzes are **open book** and **will be taken in class on your laptop** during their designated dates and will cover only the material covered since the last quiz. They will consist of short computational, multiple choice and short answer questions. You will not be expected to write or interpret R code. Make-up quizzes will be given ONLY in the case of extreme emergencies (severe illness, death in the immediate family) and when accompanied by appropriate documentation (e.g. doctor's note). In the case of unexcused absences (travel plans, overslept, etc.), there are no make-up quizzes. If you have been tested or have been exposed to COVID, and cannot take the test in class but can take it at home, we will provide accommodations to take the quiz during the same time as the rest of the class.

Final course project

The purpose of the final course project is to provide students the opportunity to apply the concepts and methods learned in class on a real-world problem of their choice. The project is an individual project. It will be completed in phases, which are designed to ensure progress throughout the quarter. The project will involve choosing at least one specific community (city or county) and answering a question about that community. You will (i) identify a community of interest (city or county with a population size in the top 100); (ii) identify a question you want to answer for that community; (iii) find some data that pertain to the community and topic of interest; (iv) organize those data so that you can analyze them; (iv) perform some analysis on the data; (v) present your results through a StoryMap; (vi) give feedback to your peers' StoryMaps. More detailed information of project parameters are provided on Canvas in the document "final_project_description.pdf" in the Final Project folder on Canvas.

The phases are described below with percent of total class grade in parentheses.

- Phase 1: Proposal I (5%)

  Decide on at least one community. You can choose more than one community if you want to make comparisons. See the list of eligible communities on the class website. Decide on a topic you want to research on for your community and submit a map of your community showing something related to your topic of choice.

- Phase 2: Submit a StoryMap (20%)

  You will present your community, the project's aims and significance, data sources, methods, and results through a StoryMap.

- Phase 3: Peer Evaluation of StoryMaps (5%)

Once you complete your StoryMap, share the link on the Canvas online forum. Explore the StoryMaps your classmates uploaded. Reply with thoughtful commentary on at least two of your classmates' maps, highlighting areas where your stories intersect, how your maps complement each other, or how your interpretation complicates their story.

Class Grade Distribution by Percentage

A	93.00-100.00	**C+**	77.00-79.99
A-	90.00-92.99	**C**	73.00-76.99
B+	87.00-89.99	**C-**	70.00-72.99
B	83.00-86.99	**D+**	67.00-69.99
B-	80.00-82.99	**D**	63.00-66.99

Simply completing the course requirements does not entitle a student to a grade of A or B. "A" grades are earned for exceptional work. Requests for reconsideration of grades will be accepted only in writing with a clear statement of what the student believes has been mis-graded within one week of receiving the graded material. Please submit your original full assignment or midterm along with your request for grade reconsideration. *Important: In reviewing the requested assignment for grade reconsideration, grades may be revised up or down depending upon the reassessment of the graded material.*

Course Communication

All class announcements will be made on Canvas. Please visit office hours with any questions or issues about the material or the course itself before it is too late (i.e., the day before an assignment is due). *You can visit instructors for office hours either in person or via Zoom*. Please begin the subject line for all emails with "CRD 150:" and maintain professional email etiquette. If you email us a bunch of code and ask us to interpret it, do not expect a reply. Bring these types of questions to office hours. Email responses may take a couple days, and email will not be checked regularly during evenings and weekends. In general, any question or concern requiring a reply longer than a few sentences is best discussed in office hours. Please double check the syllabus and relevant course documents for answers to course questions.

Code of Conduct

As the instructor and assistants for this course, we are committed to making participation in this course a harassment-free experience for everyone, regardless of level of experience, gender, gender identity and expression, sexual orientation, disability, personal appearance, body size, race, ethnicity, age, or religion. Examples of unacceptable behavior by participants in this course include the use of sexual language or imagery, derogatory comments or personal attacks, trolling, public or private harassment, insults, or other unprofessional conduct.

Academic Misconduct: Plagiarism and other forms of academic dishonesty will not be tolerated and will have serious consequences. All completed assignments must be original work. If you plagiarize, you will receive a zero on the assignment and suffer disciplinary action. Examples of plagiarism include copying or paraphrasing the work of another person without citing the source, the use of AI such as ChatGPT, or allowing another person to copy your work. If you are not sure whether something is plagiarism or are unfamiliar with the University Code of Academic Conduct, see http://sja.ucdavis.edu/cac.html. Students who cheat or plagiarize will be reported to the Office of Student Support and Judicial Affairs. Those who violate campus rules on academic misconduct are subject to disciplinary sanctions, including suspension and dismissal from the University. Ignorance of these rules is no defense!

Special Circumstances: Students requiring special accommodations (e.g., disabilities, religious holidays) should notify the instructor by end of the first week so appropriate arrangements can be made. Students sometimes experience personal problems during the term that interfere with their learning. If this happens to you, please meet with an instructor as soon as possible to discuss appropriate resources and develop a plan for managing your coursework.

Student Resources

The university supports those who wish to continue to mask indoors, including those who are immunocompromised or otherwise concerned. Yolo county's official recommendation is that we should be careful and thoughtful and support those who wish to wear a mask while not penalizing those who elect to not wear a mask or make assumptions about why they are doing so.

All campus wide announcements regarding the COVID-19 pandemic can be found here: https://www.ucdavis.edu/coronavirus/. More information about local and statewide public health directives can be found here: https://campusready.ucdavis.edu/students-and-families.

Student Health & Counseling Services: Call 530-752-0871 to schedule an individual counseling appointment (shcs.ucdavis.edu); For immediate mental health crisis assistance, call the Acute Care Clinic at 530-752-2349 to speak with an advice nurse or make an appointment.

- UC Davis Listed Crisis Support: https://healthy.ucdavis.edu/mental-emotional/support
- Yolo County Suicide Prevention (available 24 hours every day): 530-756-5000
- Suicide Prevention & Crisis Services of Yolo County: 1-888-233-0288
- National Suicide & Crisis Lifeline in English: dial or text 988, https://988lifeline.org/
- National Suicide & Crisis Lifeline in Spanish: dial or text 988, https://988lifeline.org/es/home/

Center for Advocacy, Resources & Education: The CARE program (ucdcare@ucdavis.edu or 530-752-3299) is dedicated to reducing the incidence and

impact of sexual harassment and sexual violence. They provide confidential advocacy, support, and healing services to survivors of sexual harassment and all forms of sexual violence, including sexual assault, intimate partner violence, and stalking.

- National Domestic Violence Hotline: 1-800-799-7233, http://www.thehotline.org/
- National Child Abuse Hotline: 1-800-422-4453, https://www.childhelp.org/hotline/

Aggie Compass Basic Needs Center: The Aggie Compass is a safe space for students to build community and learn about basic needs resources, pick up fresh fruits and vegetables, receive CalFresh enrollment assistance and help finding stable housing. https://aggiecompass.ucdavis.edu/aggie-info-help-line

Academic Assistance & Tutoring Centers: Academic advising, tutoring, workshops, mentorship, proofreading, and other services provided in Shields Library and the Teaching & Learning Complex.

AB 540/Undocumented Student Center https://undocumented.ucdavis.edu

Need help knowing where to go or what to do as a student: https://ebeler.faculty.ucdavis.edu/resources/faq-student-resources/

Course Agenda

The schedule is subject to revision throughout the quarter. See Course Readings for full reading references.

Date	Lecture/Lab	Topic	Readings	Assignment due	Quiz	Project due
M 1/8	Lecture	Introduction to class Data analysis framework	Handout 1 Duarte & deSouza			
W 1/10	Lecture	Introduction to R				
F 1/12	Lab	Introduction to R				
M 1/15	Lecture	Martin Luther King Jr. Day: No class				
W 1/17	Lecture	Data wrangling in R	Handout 2	HW 1		
F 1/19	Lab	Data wrangling in R				
M 1/22	Lecture	Introduction to the U.S. Census	Handout 3			
W 1/24	Lecture	Working with U.S. Census data in R		HW 2		
F 1/26	Lab	Working with U.S. Census data in R				
M 1/29	Lecture	Exploratory data analysis	Handout 4			
W 1/31	Lecture	Exploratory data analysis in R		HW 3		
F 2/2	Lab	Exploratory data analysis in R				

Date	Lecture/Lab	Topic	Readings	Assignment due	Quiz	Project due
M 2/5	Lecture	Introduction to spatial data	Handout 5			
W 2/7	Lecture	Spatial data in R		HW 4		
F 2/9	Lab	Spatial data in R				
M 2/12	Lecture	Exploratory spatial data analysis	Handout 6		Quiz 1	
W 2/14	Lecture	Exploratory spatial data analysis in R		HW 5		
F 2/16	Lab	Exploratory spatial data analysis in R				
M 2/19	Lecture	President's Day: No Class				
W 2/21	Lecture	Measuring segregation	Handout 7	HW 6		
F 2/23	Lab	Measuring segregation in R				
M 2/26	Lecture	Big data and Open data	Handout 8			Proposal
W 2/28	Lecture	Working with Open Data in R		HW 7		
F 3/1	Lab	Working with Open Data in R				
M 3/4	Lecture	Guest Lecture (*Zoom*): Diamond Spratling, Founder, Girl + Environment				

Date	Lecture/Lab	Topic	Readings	Assignment due	Quiz	Project due
W 3/6	Lecture	StoryMaps using ArcGIS online	Lung-Amam & Dawkins; Davis et al.	HW 8		
F 3/8	Lab	StoryMaps using ArcGIS online				
M 3/11	Lecture	Guest Lecture: TBD			Quiz 2	
W 3/13	Lecture	Final project in-class workshop				
F 3/15	Lab	TBD				
W 3/20		**StoryMap due on Canvas by 5:00 pm**				StoryMap
Th 3/21		**StoryMap peer evals due on Canvas by 5:00 pm**				StoryMap peer evals

Course Readings

Handout 1: Data Analysis Framework

Handout 2: Data Wrangling

Handout 3: Introduction to the United States Census

Handout 4: Descriptive Statistics

Handout 5: Introduction to Spatial Data

Handout 6: Exploratory Spatial Data Analysis

Handout 7: Segregation

Handout 8: Introduction to Big Data and Open Data

Duarte, F., & deSouza, P. (2020). Data Science and Cities: A Critical Approach.

Davis, B., Foster, K. A., Pitner, R. O., Wooten, N. R., & Ohmer, M. L. (2024). Innovating Methodologies for Examining Gentrification-Induced Social and Cultural Displacement: An Illustration of Integrating Photovoice into Story Map. *Urban Affairs Review*, 10780874231177628.

Lung-Amam, W. S., & Dawkins, C. (2019). The power of participatory story mapping: Advancing equitable development in disadvantaged neighbourhoods. *Community Development Journal*.