CPLN 5920-MUSA 5080:
Public Policy Analytics

Spring 2026

Allison Lassiter

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Course Information

Time: Tuesdays, 1:45–4:45 PM
Location: Stiteler 264
Instructor: Dr. Allison Lassiter
Email: alass@design.upenn.edu
Office Hours: Wednesdays 10–12PM @313 Duhring or by Zoom *Use Link To Sign Up*
TA Office Hours: Zhanchao Yang (zhanchao@design.upenn.edu), Tuesdays 1-2PM *Use Link To Sign Up*

Course Description

This course teaches advanced spatial analysis and introduces data science and machine learning tools within the context of urban planning and public policy. Unlike private-sector data science focused solely on optimization, our approach emphasizes public goods, governance, and equity. We'll cover topics including transportation, housing, public health, and criminal justice, using both spatial tools and predictive modeling to help guide resource allocation and policy design.

Key Focus: Understanding concepts deeply rather than just completing code. We emphasize fairness, transparency, and understanding the implications of our models.

Learning Outcomes

By the end of the semester, students will be able to:

- Build and evaluate predictive models for public policy questions
- Critically assess model generalizability, effectiveness, and bias
- Navigate the full data science workflow: wrangling, exploration, modeling, and communication
- Integrate spatial and temporal variables into policy-oriented models
- Communicate uncertainty, limitations, and equity impacts to decision-makers
- Create professional data science portfolios using Quarto

Course Materials

Required Texts (All Free Online)

- Ken Steif, *Public Policy Analytics*
- Hadley Wickham et al., *R for Data Science*
- Robin Lovelace et al., *Geocomputation with R*
- Kyle Walker, *Analyzing US Census Data*

Supplemental Material

- Selected chapters from *Visualization for Social Data Science*
- Additional readings provided weekly via Canvas

Assessment Structure

Component	Weight	Description
Weekly In-Class Quizzes	35%	Concept-focused assessments (10 quizzes, lowest score dropped)
Lab Assignments (5 total)	20%	Implementation + feedback response graded on 3-point scale
Midterm: House Prediction Competition	15%	Team-based modeling competition with lightning presentations

Component	Weight	Description
Final Modeling Challenge	25%	Real-world policy problem requiring model selection and justification
Participation	5%	Attendance and engagement

Lab Assignment Structure

Philosophy: Lab assignments assess coding implementation, documentation, and professional response to feedback. Knowledge of underlying concepts is evaluated through weekly quizzes. Ultimately, the labs will form your final portfolio for this course so the amount of effort you put into each assignment is for your own benefit.

Lab Assignment Structure:

Labs 1, 2, 4, and 5 are individual assignments. Lab 3 (House Prediction) is completed in teams of 3-4 students.

Assignment Sequence:

1. **Census Data Exploration** (Individual)
2. **Neighborhood Indicators** (Individual)
3. **House Price Prediction Competition** (Team-based) - *Serves as Midterm*
4. **Predictive Policing** - Poisson Regression (Individual)
5. **Bike Share Rebalancing** - Space-Time Modeling (Individual)

Final Modeling Challenge: Teams work on a real-world policy problem and choose the most appropriate modeling approach from the semester (linear regression, count models, logistic regression, or space-time modeling). The challenge emphasizes problem framing, methodology justification, and complete workflow implementation.

GitHub-Based Feedback Response: Each assignment (after the first) must include a `feedback-response.md` file addressing: - How you incorporated previous TA feedback - Specific improvements made to visual clarity of figures, documentation, writeups - Challenges encountered and solutions attempted - Questions or areas needing clarification

Lab Grading Scale:

- **2 points:** Complete implementation + feedback incorporation + clear documentation.
- **1 point:** Somewhat complete, poor feedback integration or unclear work
- **0 points:** Not submitted, incomplete, or no evidence of engaging with feedback

Weekly Quiz: Each class period will begin with an in-person, written quiz on material from the prior week or the prior lab assignment. There will be a total of 10 quizzes, but I will drop the lowest one.

Course Format

Structure: Each 3-hour session combines conceptual lectures with hands-on labs

Expectations:

- Bring charged laptops for live coding and group work
- Revise past work based on TA feedback for portfolio improvement
- Engage actively in discussions and collaborative problem-solving
- Attend class!

Technology: All work will be completed in R using Quarto for reproducible, professional documentation.

Weekly Schedule

Week	Date	Topic	Assessment	Lab Assignment	GitHub Deliverables
1	Jan 20	Course Intro • Quarto & GitHub Setup • R Review	—	Setup & Portfolio Init	Initial repo
2	Jan 27	Census Data + Wrangling • Basic Visualization	Q1	**Lab 1 Start:** Census Exploration	Lab 1 progress
3	Feb 3	EDA • Visual Design Foundations	Q2	Lab 1 continued	Lab 1 progress
4	Feb 10	Spatial Operations • Neighbor-hood Indicators	Q3	**Lab 1 Due + Lab 2 Start**	Lab 1 final + Lab 2 start
5	Feb 17	Linear Regression I • Making Predictions	Q4	Lab 2 continued	Lab 2 progress

Week	Date	Topic	Assessment	Lab Assignment	GitHub Deliverables
6	Feb 24	Linear Regression II • Model Evaluation	Q5	**Lab 2 Due + Lab 3 Start** (Teams)	Lab 2 final + Lab 3 start
7	Mar 3	Spatial Auto-correlation • Intro to Spatial ML	Q6	**Lab 3 Continue** (Teams)	Lab 2 final + Lab 3 start
SPRING BREAK					
8	Mar 17	**House Prediction Presentations** + Count Models-Predictive Policing	**Competition Presentations**	**Lab 3 Due**	Lab 3 final + presentations
9	Mar 24	Logistic Regression I • Geographic Cross-Validation	Q7		
10	Mar 31	Logistic Regression II • Recidivism Case Study	Q8	**Lab 4 Start:** Parole Reform Analysis	Lab 4 start
11	Apr 7	Space-Time Modeling • Temporal Analysis	Q9	**Lab 4 Due + Lab 5 Start:** Bike Share	Lab 4 final + Lab 5 start
12	Apr 14	Text Analysis + *k*-means clustering. Final Challenge Introduced in Class	Q10	Lab 5 continued	Lab 5 progress

Week	Date	Topic	Assessment	Lab Assignment	GitHub Deliverables
13	Apr 21	**Final Challenge Continued - Teams work in class.**		Lab 5 Due	Lab 5 final
14	Apr 28	**Final Challenge Presentations**			Final Challenge Deliverables Due in 1 week.

Academic Integrity & AI Policy

Core Principle

All written work must be in your own words and demonstrate your understanding of concepts.

AI Tool Guidelines

- **Permitted:** Using AI for debugging code, understanding error messages, understanding or decoding samples.
- **Not Permitted:** Copying/pasting AI-generated text for assignments, having AI complete entire problems. Using AI to interpret your results or do your data analysis. Providing responses suggested by AI that you do not fully understand.
- **Quiz Preparation:** Use AI to help understand concepts, but ensure you can explain ideas without assistance

Please see the university policy on academic integrity. Cases of academic dishonesty on assignments will result in a score of 0 on the assignment and may incur disciplinary action.

Additional FAQ Information

Late Assignments: Please turn in your assignments on time. I understand that you have many other courses and I've done by best to make the required work reasonable. The concepts in this course are cumulative and it is necessary to keep up with the work by turning in your assignments on time.

Revising & Resubmitting Assignments: The lab assignments cannot be revised and resubmitted. You'll receive general feedback on how to improve in future work and as long as you complete the assignment and continue to improve, you'll 'pass' the assignment. Therefore, there is no option to revise and resubmit for a higher grade.

Email Policy: 24-hour response time goal. For coding issues, please share your repository link.

Acknowledgement: This course was developed by Dr. Elizabeth Delmelle, who built from Michael Fitchman and Dr. Ken Steif. I am indebted to them for their work! All mistakes are my own.

This syllabus may be modified during the semester. Check Canvas for the most current version.