DR. LACE M.K. PADILLA - TEACHING STATEMENT

My pedagogy reflects a commitment to teaching students to reason with complex data. I focus on improving science literacy by leveraging empirical research on effective science communication to **prepare students to become educated information consumers and ethical information producers**. Students trained in this discipline will be equipped to integrate data communication and decision making to address large-scale problems.

At the core of my pedagogy is the integration of theory, practice, and reflection, an approach I apply consistently across a wide range of undergraduate and graduate courses, spanning introductory offerings, core requirements, and advanced special topics (for an overview of my courses, see Table 1). I structure my courses to move iteratively between hands-on design work and the perceptual, cognitive, and ethical principles that explain why certain designs succeed or fail. This approach encourages students to understand not only how to build visualizations, but why particular design decisions influence interpretation, persuasion, and trust.

Interactive learning plays a central role in my teaching, particularly in my undergraduate course **DS 4200: Information Presentation and Visualization**. Class sessions typically begin with concrete demonstrations of visualization or media principles, such as interaction design, narrative framing, or uncertainty representation, which allow students to experience firsthand how visual form shapes meaning. These demonstrations are then situated within relevant theoretical frameworks, helping students connect design practice to research on perception, cognition, and communication.

One assignment that exemplifies this approach asks students to design two contrasting visualizations from the same dataset: one that prioritizes ethical transparency and another that is intentionally misleading. Using datasets related to climate change and social equity, students confront the ethical and rhetorical consequences of design choices, learning that visualization is a powerful communicative act with real-world implications. This exercise consistently sharpens both technical fluency and ethical reasoning, reinforcing the responsibility that comes with visual communication.

At the graduate level, my teaching emphasizes *critical making* as a bridge between theory and applied research. For example, in **Global Good Studio: Data Visualization**, students engage with societally relevant problems through visualization and communication design, producing projects such as multilingual air-quality materials for California farmworkers and interactive dashboards to support disaster preparedness. These projects require technical rigor while foregrounding civic impact, closely aligning with my broader research agenda. Complementing this studio-based approach, I also teach graduate courses including **CS 5340: Computer–Human Interaction** and **CS 7250: Info Viz Theory and Application**, which focus on perception, cognition, design methods, and evaluation. Across these courses, semester-long projects and preregistered user studies train students to integrate ethical considerations with methodological rigor, preparing them for research careers in both academic and industry settings.

Accessibility, Inclusion, and Educational Reach

Accessibility and inclusivity are integral to my teaching practice. All lectures are recorded and professionally edited, allowing students to engage with course material in flexible and accessible ways. Beyond the classroom, I maintain an educational YouTube channel, **Dr. DataVis**, which has over 20,000 subscribers and provides free instruction on data visualization, data ethics, and research skills. Faculty at under-resourced institutions have reported incorporating these materials into their courses, extending the reach of my teaching and reinforcing my commitment to open and equitable education.

Table 1: Overview of undergraduate and graduate courses taught across institutions, including enrollment and term.

Terms	Course	Enrolled	University
Fall 2023, Spring 2025	CS 7250: Info Viz Theory and Application	23, 45	NEU
Spring 2024	CS 5340: Computer/Human Interaction	3	NEU
Fall 2024	CS 7295: HCI and VIS for Decision Making	3	NEU
Spring 2025	PSYC 3466: Cognition	13	NEU
Summer 1 2025	DS 4200: Information Presentation + Visualization	60	NEU
Spring 2020, Spring 2021, Fall 2021, Fall 2022	COGS 170: Judgment and Decision Making	60, 90, 60, 90	UC Merced
Spring 2020, Fall 2021, Fall 2022	COGS 214: Global Good Studio, Data Visualization	9, 6	UC Merced
Spring 2022	COGS 001: Introduction to Cognitive Science	205	UC Merced
Fall 2020	COGS 250: Mind, Technology, & Society Talk Series	32	UC Merced

Table 2: Summary of course evaluation means for Padilla's courses at Northeastern University, compared to departmental and university averages. All courses listed were taught at **Northeastern University**.

Padilla's Courses at Northeastern	Enrolled	Course Mean	Department Mean	University Mean
CS 7250: Info Viz Theory and Application (Fall 2023)	23	4.62	4.36	4.40
CS 5340: Computer/Human Interaction (Spring 2024)	3	NA	NA	NA
CS 7295: HCI and VIS for Decision Making (Fall 2024)	3	NA	NA	NA
PSYC 3466: Cognition (Spring 2025)	13	4.70	4.48	4.44
CS 7250: Info Viz Theory and Application (Spring 2025)	45	4.72	4.36	4.44
DS 4200: Information Visualization (Summer 2025)	60	4.68	4.58	4.44
Overall Average	**147**	**4.68**	**4.45**	**4.43**

Student feedback consistently reflects the effectiveness of this approach, with my evaluated courses at Northeastern rated above both departmental and university averages (for an overview of student evaluations, see Table 2). Across evaluated offerings, my courses have an overall mean of **4.68** across **147 enrolled students**, which is **5.2% higher** than the departmental average and **5.6% higher** than the university average. This pattern is consistent across evaluated courses. For example, in **CS 7250: Information Visualization Theory and Applications**, my Spring 2025 evaluation score was **4.72**, which is **8.3% higher** than the departmental average and **6.3% higher** than the university average. This pattern is especially noteworthy given the well-documented evidence that women and faculty of color often receive lower student evaluations than their peers, independent of teaching effectiveness [1]. As both a woman and a person of color, I occupy identities that remain substantially underrepresented in computer science, a field in which national reports continue to document persistent gender and racial/ethnic disparities [2]. This context strengthens the interpretation of these evaluations as evidence of effective and inclusive teaching. Students frequently note the clarity, organization, and relevance of my courses, as well as the supportive learning environment fostered across diverse disciplinary backgrounds. See the highlighted text boxes to the right for selected student comments.

CS 7250: Info Viz Theory and Application
Spring 2025

Selected student comments

"This is HANDS DOWN the most organized and well-delivered online course I have ever taken. I am a former teacher myself, and Prof. Padilla was exceptionally organized in delivering high-quality content for an online course."

"Prof. Padilla's video content is better than anything I've seen so far at NEU; arguably better than most of the content I have seen online—period. She clearly put a lot of time and energy into professionally editing and putting together digestible videos, which is not easy given the complexity of the topics we discussed."

"Dr. Padilla is a fantastic instructor with a clear passion for the subject and a talent for making complex ideas accessible. Her teaching style is thoughtful, engaging, and inclusive, and she consistently encourages questions, different perspectives, and active participation."

DS 4200: Information Presentation & Visualization
Summer 2025

Selected student comments

"She definitely had the most organized lectures throughout my entire college experience."

"Unlike other online classes I have taken, Dr. Padilla took the time to create personal lecture videos with studio-like quality that were engaging and interesting to listen to. In recitation and office hours, she showed a clear interest in helping students and furthering their knowledge, and was always easy to reach and thorough in answering questions or concerns."

"It was obvious how much Dr. Padilla cared about the course and her students. She went out of her way to make this course a positive learning experience for everyone."

Student Mentorship

Mentorship is a cornerstone of my academic practice. I advise four PhD students, three at Northeastern and one at UC Merced, one post-doc and Northeastern, and one Master's student at UC San Diego (for and overview, see Table 3). I emphasize high expectations paired with sustained support, helping students develop independence, confidence, and scholarly identity. Under my mentorship, students have won major paper awards at IEEE VIS and ACM CHI and published first-author work in ACM CHI, IEEE VIS, and IEEE TVCG. Many of these projects originated as student-led ideas and matured into award-winning research through collaboration, reinforcing my belief in mentoring as a developmental and partnership-driven process.

Racquel Fygenson, Ph.D. (2023–2026, Northeastern) was awarded her Ph.D. in 2026. Her work with me has received multiple distinctions, including the **Best Paper Award at IEEE VIS 2022**, the **Best Poster Award at the Gordon Research Conference in 2025**, and a **Best Paper Honorable Mention at CHI 2026**. She has co-authored foundational work on multiple forecast visualizations, including studies of trust and performance in COVID-19 forecasting [3, 4], interpretation strategies for multiple forecasts [5], and forecast aggregation for decision-making [6]. She has also advanced our cognitive affordances framework through work on visualization theory [7], density plot interpretation [8], and Croissant Charts [9].

Wen Xu (Ph.D. Student, 2024-ongoing, Northeastern) is the primary author of an *IEEE VIS* paper that makes deep theoretical and practical contributions to visualization research. Her work demonstrates how violations of assumed encoding rules lead to systematic misinterpretation of connected scatterplots, and shows that explicitly shifting viewer expectations can substantially mitigate these errors [10].

Kai Nylund (Ph.D. Student, 2025-ongoing, Northeastern) is an strong early-career researcher who is currently preparing a first-author manuscript for submission to CHI 2026. Prior to joining my group, he co-authored two high-impact papers in *Nature*, contributing to large-scale international collaborations that produced brain-wide maps of neural activity and representations of prior information during decision-making [11, 12].

Helia Hosseinpour, Ph.D. (2020-2026, UC Merced) was awarded her Ph.D. in 2026, which includes foundational work on how individual differences in working memory and perceived effort shape uncertainty interpretation, published in *IEEE TVCG* [13]. She has also contributed to research on the limits of small multiples in line graphs [14], applied studies of uncertainty communication in high-stakes contexts such as pandemic risk perception and multi-hazard forecasting [4, 15], and more recent work on trust and decision-making [16, 17].

Anjana Arunkumar, Ph.D. (Postdoctoral Researcher, 2024–2026, Northeastern) has developed a strong research program at the intersection of visualization cognition, communication, and user experience. Her work with me includes multiple first-author publications in top-tier visualization and HCI venues. She led a *CHI* 2025 paper examining how bilingualism shapes reader preferences for annotated charts [18] and an *IEEE VIS* paper on how mind wandering can be used to track the evolution of user experience with data visualizations [19]. She also contributed to an *IEEE VIS* paper analyzing the functions of text in information visualization [20].

Ruishi Zou (Master's student, 2024–2026, UC San Diego) is a highly productive early-career researcher for whom I serve as a primary mentor. His work with me has received recognition, including a **Best Paper Honorable Mention at CHI 2026**. He is first author on studies of forecast aggregation and decision-making at IEEE PacificVis [6] and *MIND*, a CHI 2026 narrative dashboard for mental health clinicians [21]. Through our work together, I helped him develop an interdisciplinary research agenda and transition into a Ph.D. position at Harvard.

Table 3: Summary of mentored students and postdoctoral researchers, including publication outcomes, top-tier venue publications, first-author top-tier publications, awards, and career outcomes. Publication and award counts reflect only work completed in collaboration with Padilla.

Mentee	Role	Uni.	Dates	Pubs.	Total Pubs.	Top-Tier Pubs.	First-Author Top-Tier	Awards	Outcomes
Racquel Fygenson	Ph.D. student	NEU	2023–2026	[3, 4, 5, 6, 7, 8, 9]	7	6	3	3	**Ph.D. defended**
Wen Xu	Ph.D. student	NEU	2024–ongoing	[10]	1	1	1	–	Ongoing student
Kai Nylund	Ph.D. student	NEU	2025–ongoing	–	–	–	–	–	Preparing manuscript
Helia Hosseinpour	Ph.D. student	UC Merced	2020–2026	[13, 14, 4, 15, 16, 17]	6	3	1	–	**Ph.D. defended**
Anjana Arunkumar	Post-doc	NEU	2024–2026	[18, 22, 19, 20]	4	4	3	–	Postdoctoral researcher
Ruishi Zou	Master's student	UC San Diego	2024–2026	[6, 21]	2	2	2	1	Ph.D. at Harvard
Total					**20**	**16**	**10**	**4**	

Teaching Trajectory and Future Directions

The foundation of my teaching and mentoring lies in advancing data and media literacy while promoting equitable participation in digital culture. My experience teaching across computer science and psychology equips me to serve interdisciplinary student populations effectively. Looking forward, I aim to continue developing courses and mentoring structures that integrate cognitive theory, ethical design, and real-world impact, preparing students to engage critically with data-driven systems that increasingly shape society.

Courses Taught

DS 4200: Information Presentation & Visualization (Northeastern University). This undergraduate course introduces foundational principles of data visualization, including visual perception, the grammar of graphics, interaction, and ethical communication. Students learn how visualizations can be used both to explore

data and to reason about and communicate complex information. The course emphasizes iterative design, evaluation, and good programming practices, with students developing static and interactive visualizations using Vega-Lite and D3.js. Assignments require substantial writing and reflection, reinforcing the idea that visualization is both a technical and communicative practice. By the end of the course, students are equipped to design effective, principled visualizations grounded in theory and implemented through modern web technologies.

CS 7250: Information Visualization Theory and Applications (Northeastern University). This graduate-level course provides a rigorous introduction to visualization theory, design methods, and evaluation. Topics include data types, visual encodings, perception and cognition, interaction techniques, and visualization critique. Students develop interactive visualizations using JavaScript, HTML, CSS, Vega-Lite, and D3.js, while also producing substantial written work such as design critiques, project reports, and documentation. The course emphasizes visualization as a form of reasoning and communication, preparing students to conduct research-quality design, serving as a foundation for dissertation and publication-oriented work.

CS 5340: Computer–Human Interaction (Northeastern University). This course introduces core principles and methods for designing and evaluating human–computer interfaces. Students learn user-centered design approaches including ethnography, personas, task analysis, and prototyping, as well as quantitative and qualitative evaluation methods. The course integrates cognitive models of human performance (e.g., Fitts' Law, Hick–Hyman Law) and addresses accessibility, nomadic interaction, and design for diverse populations. Through iterative projects, students develop the ability to critically assess interface designs and to apply HCI principles in both research and applied contexts.

CS 7295: Special Topics — HCI and Visualization for Decision Support Tools (Northeastern University). This advanced seminar explores the intersection of decision-making theory, data visualization, and HCI in the design of decision-support systems. Students engage deeply with theories of judgment, decision-making, cognitive bias, and behavioral change, and learn how to translate these theories into visualization and interface interventions. The course is discussion-driven, with students leading weekly paper discussions. Major assignments include an independent midterm intervention design and a final project in which students produce an OSF preregistration to evaluate their proposed system. The course prepares students to conduct theoretically grounded, ethically informed research on decision-support technologies.

PSYC 3466: Cognition (Northeastern University). This course introduces students to the interdisciplinary foundations of cognitive science, covering topics such as perception, attention, memory, language, learning, problem solving, and decision-making. Drawing on perspectives from psychology, neuroscience, computer science, philosophy, and artificial intelligence, the course emphasizes how different theoretical frameworks and methodological approaches address questions about the mind. Students gain exposure to experimental design, statistics, formal logic, and computational approaches, building a foundation for applying cognitive theory to real-world technological and social contexts.

COGS 214: Global Good Studio — Data Visualization (University of California, Merced). Global Good Studio is a project-based course focused on using data science and visualization to address real-world societal challenges. Students identify problems of global or community importance and work backward to acquire the technical, analytical, and communicative skills needed to address them. Projects often result in multiple portfolio-quality artifacts and include a dissemination or outreach plan, emphasizing real-world impact. Skill development spans data analysis, visualization, web development, HCI methods, open science practices, and grant writing. The course emphasizes critical making, interdisciplinary collaboration, and the use of data-driven tools for social good.

COGS 170: Judgment and Decision Making (University of California, Merced). This course surveys foundational theories and empirical findings in judgment and decision making, with applications to finance, health, law, public policy, and social behavior. Students examine rational and boundedly rational models, cognitive biases, heuristics, and individual differences in reasoning. The course is intentionally interdisciplinary and accessible to students from cognitive science, psychology, economics, political science, and related fields. By the end of the course, students are prepared to apply decision-making research to their own domains of interest.

COGS 001: Introduction to Cognitive Science (University of California, Merced). This introductory course provides a broad overview of cognitive science as an interdisciplinary field. Topics include perception, memory, language, learning, attention, consciousness, development, brain damage, and artificial intelligence. Students learn how different disciplines approach the study of cognition and how their methods and assumptions differ. The course builds foundational literacy in experimental methods, statistics, formal models, and computational thinking, preparing students for advanced coursework across the cognitive sciences.

Summary

Taken together, my teaching and mentoring record reflects a sustained commitment to excellence, breadth, and equity in education. I have taught a wide range of undergraduate and graduate courses, spanning introductory offerings, core requirements, and advanced special topics, and have instructed 699 students across two institutions. My courses consistently receive evaluations above both departmental and university averages. This is a noteworthy outcome given well-documented research showing that course evaluations for women of color are, on average, systematically lower. In parallel, my mentoring has produced productive, award-winning research, with students earning Best Paper and Best Poster awards at leading conferences and publishing in top venues, including *IEEE VIS* and *ACM CHI*. I have also demonstrated the ability to recruit exceptional doctoral students, including trainees with prior publications in *Nature*, and to support their development into independent, high-impact researchers. Beyond formal instruction, I work intentionally to ensure that my teaching materials are accessible and widely available, extending their reach to under-resourced institutions and global audiences. I hope these outcomes collectively illustrate both my passion for teaching and mentorship and my commitment to providing inclusive, high-quality education in data visualization.

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