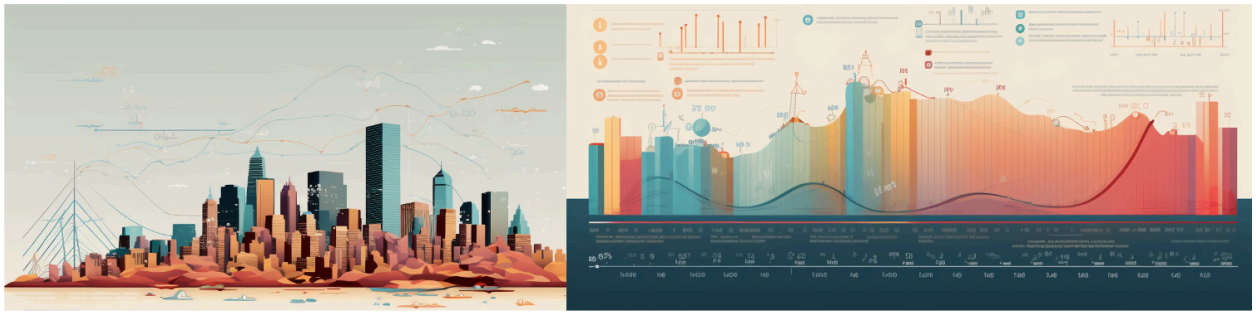
CS617* VISUALIZING.BOSTON

Data Visualization and Storytelling for the Community



In this course, you will explore the art of data visualization and storytelling using open data sources from Massachusetts and Boston. Discover the power of data-driven storytelling, a vital tool in journalism, business, advertising, and academia, for conveying information concisely and impactfully to diverse audiences. Learn the skills to process and visualize data effectively and craft compelling narratives using a variety of Python-based and web-based visualization frameworks. You will hands-on create interactive charts, study best design practices, and learn about the fundamentals and future of information visualization!

We will learn and use:

- Data Analysis with Pandas and Tableau
- Matplotlib, Seaborn, Plotly for python-based visualization
- Plotly.js, Vega-Lite, and Chart.js for interactive web-based visualization
- D3.js for advanced storytelling
- Design Best-Practices for Ethical, Inclusive, and Accessible Visualizations
- AI4VIS+VIS4AI, Machine Graphical Perception: Pairing Visualization with Machine Learning
- Github / git for version control and web-hosting

Teaching Staff

Daniel Haehn (Instructor), team@visualizing.boston or *@staff*
TAs: Avanith Kanamarlapudi and TBA

Lectures and Labs

Mondays and Wednesays 2:30p - 3:45p, Wheatley-Peters W01-0057

Office Hours

Mondays and Wednesdays 11:30a - 1:00p and by request
McCormack M03-2120, please use calendly.com/haehn to reserve a slot.

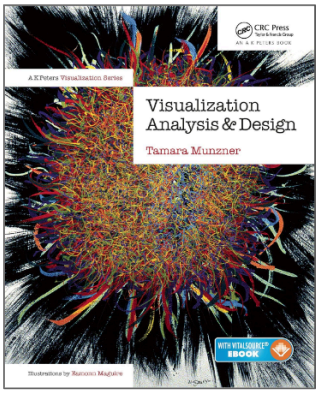
*** taught as CS480/CS697 Special Topics in Spring 2026**

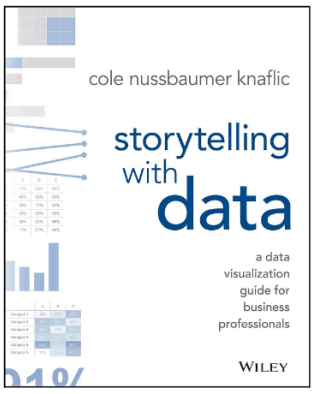
Course Objectives

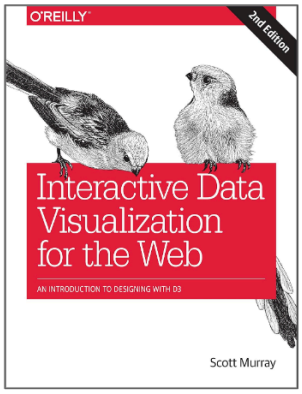
1. **Collect, clean, and process open datasets** from Massachusetts and the Boston region to support data-driven storytelling.
2. **Design and implement effective data visualizations** that clearly communicate quantitative and qualitative information to diverse audiences.
3. **Evaluate visualization design quality** in terms of clarity, accessibility, inclusiveness, and ethical responsibility.
4. **Develop and publish data stories** for community impact using reproducible workflows and clear narrative structure.

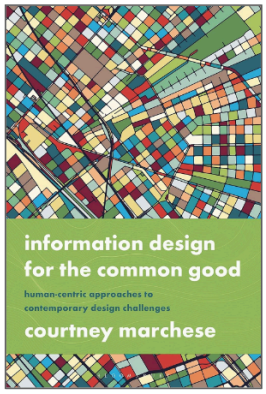
Course Material and Readings

There are no required readings for this course. However, the material is based on the following four books:









Munzner: Visualization Analysis & Design, ISBN: 978-1466508910
Knaflic: Storytelling with Data, ISBN: 978-1119002253
Murray: Interactive Data Visualization for the Web, ISBN: 978-1491921289
Marchese: Information Design for the Common Good, ISBN: 978-3319139822

Limited copies of all books are available through the teaching staff and they are available as e-books through Healey! While the books are great, **you do not need to purchase them**—the most up-to-date information is available online and will be provided.

Open Data Sources

We will use the following **local and regional open data resources** during this course: ANALYZE BOSTON, the MBTA Open Data Portal, and the Massachusetts Data Hub. Additionally, we will use the open data repositories of neighboring towns and cities such as Somerville, Arlington, Chelsea, Cambridge, Quincy, Woburn and others.

Canvas Access

Please use Canvas to access lecture videos, slides, assignments, and all other materials. Login at umassboston.instructure.com.

Discord Access

The teaching staff is available via Discord. The invite link will be shared in class.

Questions and Concerns

Please direct questions and concerns of any kind (now and during the semester) to the teaching staff in person or via Discord @staff or in the #help channel.

Course Structure

30 Lectures spanning 9 Course Modules (including Labs and Design Studies)
10 Assignments (30% of final grade, plus 10% bonus)
13 Quizzes (20% of final grade, take-home through canvas)
Final Project (40% of final grade)
Participation (in-class, in-office, and as part of Discord discussions, 10% of final grade)
No exams

Final Grade

The weighted scores from above will result in a final grade as follows:

≥ 90 = A	69-66 = C
89-86 = A-	65-62 = C-
85-82 = B+	61-58 = D+
81-78 = B	57-54 = D
77-74 = B-	53-50 = D-
73-70 = C+	below 50 = F

Interactive Lectures and Labs

Lectures and Labs/Design Studies will include interactive components. Please bring your laptop. If you do not have a laptop, please contact the teaching staff at team@visualizing.boston.

Assignments

Weekly assignments include research questions, design studios, and coding challenges. All assignments will require a written report in HTML hosted via Github pages. You will use a standard git workflow paired with an online form to submit your work. **Assignments are due Mondays at 11:59pm. No late submissions.**

Quizzes

Quizzes include multiple-choice and free-text questions. These are take-home quizzes and available on the Canvas system. **Quizzes are due Fridays at 11:59pm. No late submissions.**

Final Project

The final project is the capstone of this course and counts as 40% of your final grade. The project will involve a sophisticated visual narrative of a data story from the local or regional community.

This is your chance to apply your newly learned skills! Project teams are encouraged but working alone is also fine. In the last lectures, we will perform a peer-assessment of the project work. All students will present progress towards their final delivery. **And finally, all projects, including reports are due on the last day of the semester. No late submissions.**

Participation

In-class participation and Discord activity count towards your grade. If class attendance drops below 50%, surprise tests may happen during lectures.

Guest Lectures

We will host guest lectures from visualization experts in the Boston area.

Collaboration Policy

You are allowed and encouraged to collaborate with anybody. However, please make sure to give proper credit. For instance, if your friend helps you with an assignment or you copied code from another source, you must acknowledge their name in your code and the assignment report.

Open Source License

The course material is publicly available under the MIT license. This includes assignment code. You are free to adopt a different license for your assignment solutions.

Synergistic Activities at UMass Boston

This course leverages local and regional open data sources—implementing the **community engagement strategy** of our campus. The material taught integrates well with the existing **CS460 Graphics** and **CS615 User Interface Design** courses. In addition, ethical visualization design practices and the pairing of machine learning and visualization align with the goals of the recently established **Paul English AI Institute**.

Disability Accommodations

If you have a disability and feel you will need accommodation to complete course requirements, please contact the Ross Center for Disability Services at 617.287.7430**.**

Other Policies

We follow the Academic Policies of the Office of the Registrar.
See umb.edu/registrar/policies/ or contact team@visualizing.boston or *@staff* for questions.

Course Modules / Timeline

Module 1: Introduction to Data Visualization

What is data visualization?
Introduction to data-driven storytelling
The value and history of visualization

Module 2: Data Processing with Pandas

Introduction to Pandas for data manipulation
Data mining, filtering and preprocessing
Exploratory Data Analysis (EDA)

Module 3: Python Data Visualization Libraries

Matplotlib: Basic and advanced plotting techniques
Seaborn: Statistical data visualization
Plotly: Interactive visualizations in Python

Module 4: Web-based Visualization

HTML5 and CSS fundamentals for web-based visualization
Plotly.js for web-based interactive visualizations
Vega-Lite and Chart.js for web-based charts

Module 5: Advanced Visualization with D3.js

Introduction to D3.js for custom data visualizations
Creating interactive and animated visualizations
Incorporating D3.js with web applications

Module 6: Design and Colors

Design best practices and chart junk
Effective use of colors
Clarity and impact in visualizations

Module 7: Ethical Considerations in Data Visualization

The ethical responsibilities of data visualization practitioners
Navigating potential biases and ethical dilemmas in data visualization
Inclusive and accessible visualizations

Module 8: VIS+AI Integration and Machine Graphical Perception

AI4VIS: AI-assisted Visualization
VIS4AI: Visualization-assisted AI for explainability
Applying AI and visualization in complex data analysis scenarios

Module 9: Community Engagement

Data visualization for the Common Good
Charts for Policy Makers
Increasing Visualization Literacy