

Data Mining the City

A4834-1 / Spring 2022

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Wednesday 7PM - 9 PM

Avery 114

The ubiquity of digital technologies embedded in cities and urban-dwellers makes urban data an integral part of the design and planning of cities. Urban analytics provides an opportunity to design cities that are responsive to the needs of its constituents. This course will focus on the application of data tools to model, analyze, and simulate the urban environment. Students will develop a critical understanding of data science concepts and issues of practice of urban data models, as well as technical skills in data processing, analytical simulations, and visualization. As a class, we will explore new creative methods to better understand the dynamics between urban systems and create more insightful decisions for our future cities.

Course Topics

Problem Solvers not Data Crunchers

The main technical language of the course is [Grasshopper](#) in Rhino — a visual programming platform. The course will focus on leveraging geospatial analysis plug-in [Urbano](#) and [DecodingSpaces](#), as well as revisit basic GIS concepts and workflows via ArcGIS. Previous knowledge of these softwares are not required, though the content of the course requires perseverance. Students are required to regularly submit coursework, attend classes and submit a final comprehensive project. Class time will include lectures, discussions, and labs.

Learning Objectives

- Basic understanding of working with geospatial data in Grasshopper
- Understanding of core data science concepts, methods, and limitations
- Experimentation and design in a code-driven environment
- Performing a goal-oriented design research project using urban data

Question, Method, Insights, Action

Students will learn methods and techniques of performing urban data analysis across 3 modules: *Population, Space, and Time*. Students will work individually for the first two modules to create workflows that model specific population behaviors, urban context, and spatial context. By module 3, students will team up to combine their analysis modules into a comprehensive final project based on a structured thesis.

Modules

- Population: Defining a population behaviors and personas
- Space: Constructing urban context and spatial characteristics
- Time: Performing analysis and creating design scenarios

Medium Submissions

Students will submit a Medium post to the course website for each module by midnight on the due date.

Course Schedule

Population

Week 1 | Jan 19 | Spatial Analysis & Urban Data

- Lab: Data Sources, Collecting & Processing Data, GIS Basics

Week 2 | Jan 26 | Assumptions & Modeling

- Lab: Grasshopper Basics & Best Practices
- Module #1: Defining population behaviors and personas

Week 3 | Feb 02 | Experience & Behavior

- Lab: Importing geospatial data into Grasshopper

Week 4 | Feb 09 | Data Bias, Subjectivity, and Limitation

- Discussion: How do we use data models ethically?

Space

Week 5 | Feb 16 | Location, Location, Location

- Lab: Importing Location Data (OSM, GooglePlaces), Formatting & Filter, Data Clustering
- Module #2: Constructing urban context and spatial characteristics

Week 7 | Feb 23 | Physical Metrics: Visual Interest, Environmental Factors

- Lab: Importing DEM, Spatial Analysis in Grasshopper
- **M.Arch Midterm Review Feb 21 — Mar 4**

Week 6 | Mar 02 | Urban Network: Space Syntax & Graph Theory

- Lab: Network Analysis & Basic Routing
- Workshop: Project brainstorm & form groups

Week 8 | Mar 09 | Student Presentation

- Presentation: Students groups present research topics and project goals.

Week 9 | Mar 16 | Spring Break

- No Class!

Time

Week 10 | Mar 23 | Simulation: Amenity Demand & Trip Generation

- Lab: Simulation & Analysis
- Module #3: Performing analysis and creating design scenarios

Week 11 | Mar 30 | Data-Driven Design

- Lab: Design Scenario & Evaluation

Week 12 | Apr 06 | Visualizing Time

- Lab: Visualization & Animation & Export

Week 13 | Apr 13 | Data in Practice

- Discussion: What is the role of data analytics in the design and planning practice?

Final Project

Week 14 | Apr 20 | Desk Crit

- M.Arch Final Review May 21 — May 29

Week 15 | May 02 (Mon) | Final Presentation

Grading

- Attendance/ Participation: 20%
- Module #1: 15%
- Module #2: 15%
- Module #3: 15%
- Final Project: 35%