A4841 Algorithms & Urbanisms

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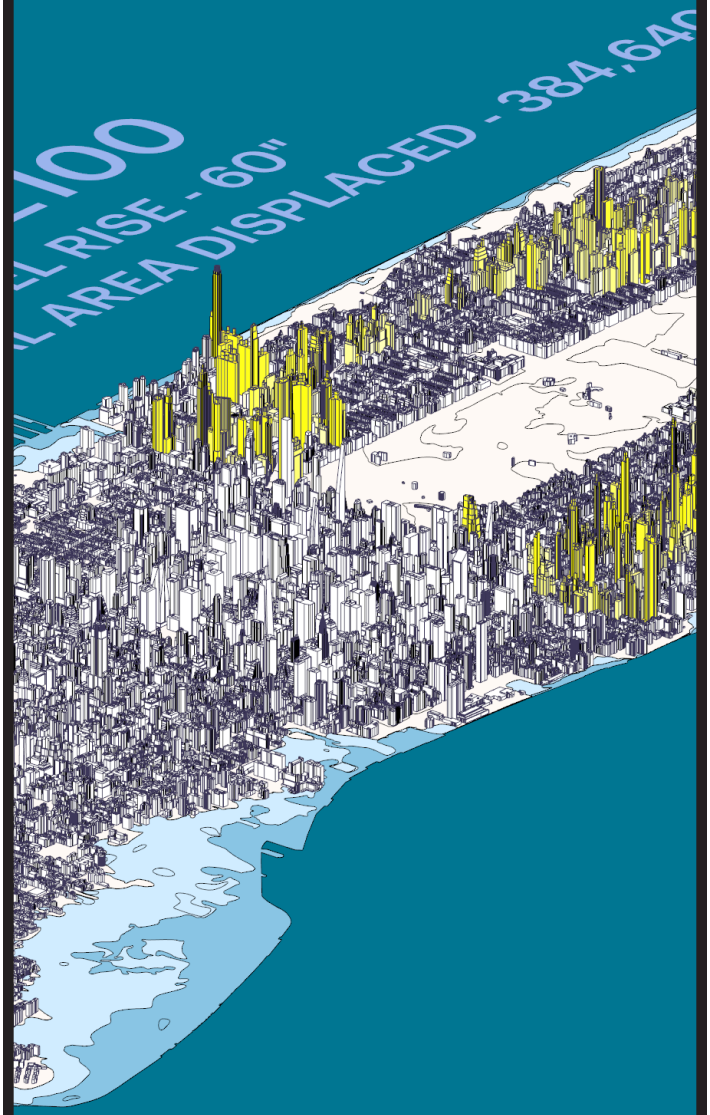


Speculative redistribution of area displaced from rising sea levels

Modern disciplinary specialization has created a gap between data science and urbanism. Data science frequently attempts to standardize data collection and analysis across all urban environments including cities, suburbs, and rural areas. Urbanism, meanwhile, focuses on the particularities and complexities of cities on both a social and spatial level. The result is two methods of inquiry that have, historically, had little overlap. This course will explore the data/urbanism gap and will attempt to hybridize, spatialize, and subvert the two approaches of inquiry.

This course will mix students across programs to explore algorithmic methods and data visualization as a means of urbanistic analysis, communication, and speculations. Students will bring their various disciplinary backgrounds to the same table, and will work together to interrogate their own industry's canon with respect to urban data analysis. Through data exploration, visualization and spatial analysis students will develop projects to investigate new methods of design and development in New York City.

Projects will be proposals to intervene in the process of city building, with teams of students creating speculative models informed by data and vetted through testing and their own disciplinary expertise. For example, what if every park had to pay for itself through the property tax from adjacent buildings? What densities does that require? What are the qualitative aspects of this development, both to maximize economic and social value creation, while mitigating potential negative externalities of dense development? How would you create the regulations that shape the new development? Were those assumptions responsible? What is an extreme outcome? How would the city change?

This course will introduce students to a range of data collection, exploration, analysis, and visualization techniques. Students will work in interdisciplinary teams. Together we will explore and develop technical methods of collaboration using data as a common language. Invited guests will come throughout the semester to present on a range of urban data centric topics and providing feedback on student projects. The range of guests will include speakers from the Department of City Planning, the New York Times, and the Real Estate Board of New York.

Teams will work with course instructors to establish projects, develop workflows to exchange data, and test proposals. In developing the workflows, data analysis and visualization we will work with and test a number of techniques and softwares, linking techniques the students are currently fluent in to new ones as needed for their projects.

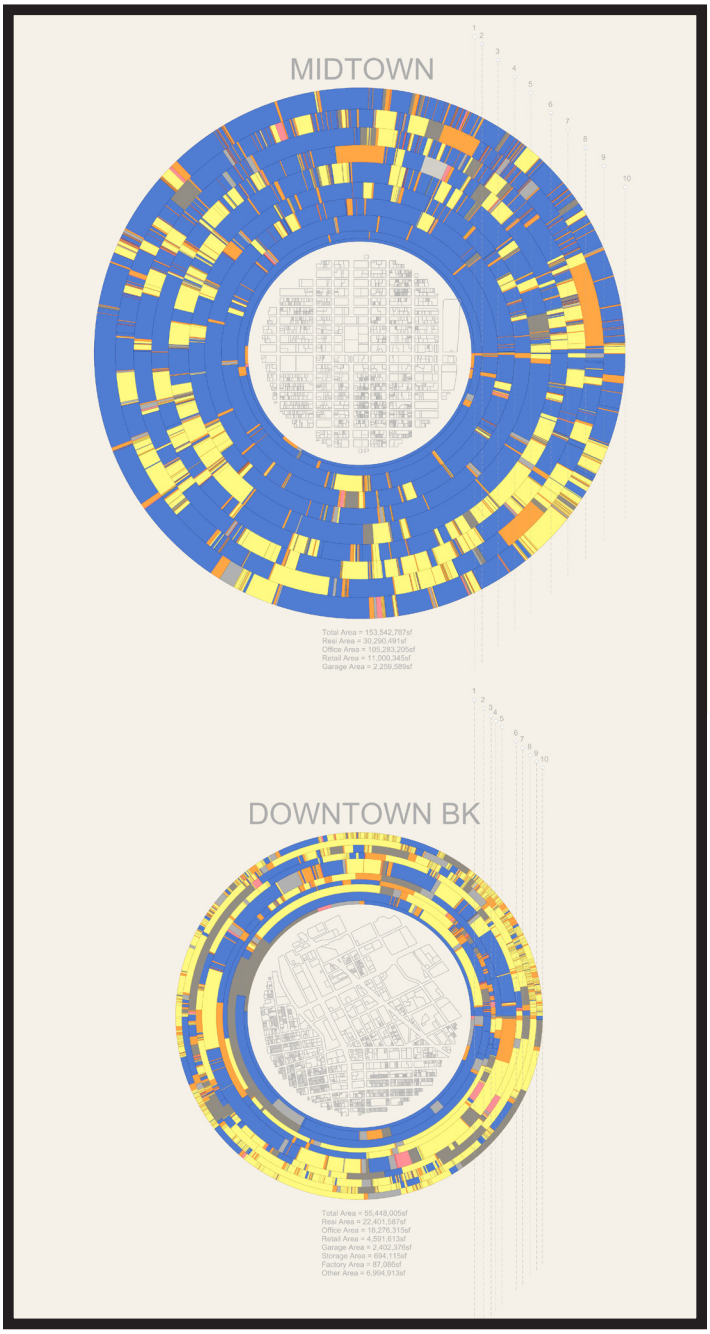
Course Structure
The course will start by learning techniques of spatial analysis, data exploration, and visualization. Students will work with open data and unique data sets provided by the course instructors (such as 8 million geo-located tweets, comprehensive streeteasy data, and close to a million Google businesses). Students will conceive of a proposal to link these datasets with a particular policy, planning, or design goal in New York City. In addition, each team will generate one unique data set particular to their goal through spatial analysis tools or API querying. This will require benchmarking and ground truthing to ensure the dataset has a useful relationship with reality.

Next, the datasets will be used to create a model whereby data analysis can be used to directly inform how the student's particular policy, planning, or design goal is implemented in the urban environment. This will include identifying sites to test the model to understand it's impact the city and to calibrate performance based rules. Students will develop real proposals for how the city might approach new development in the future from cost and value creation, to infrastructure, to zoning and land use policy, to massing and urban form.

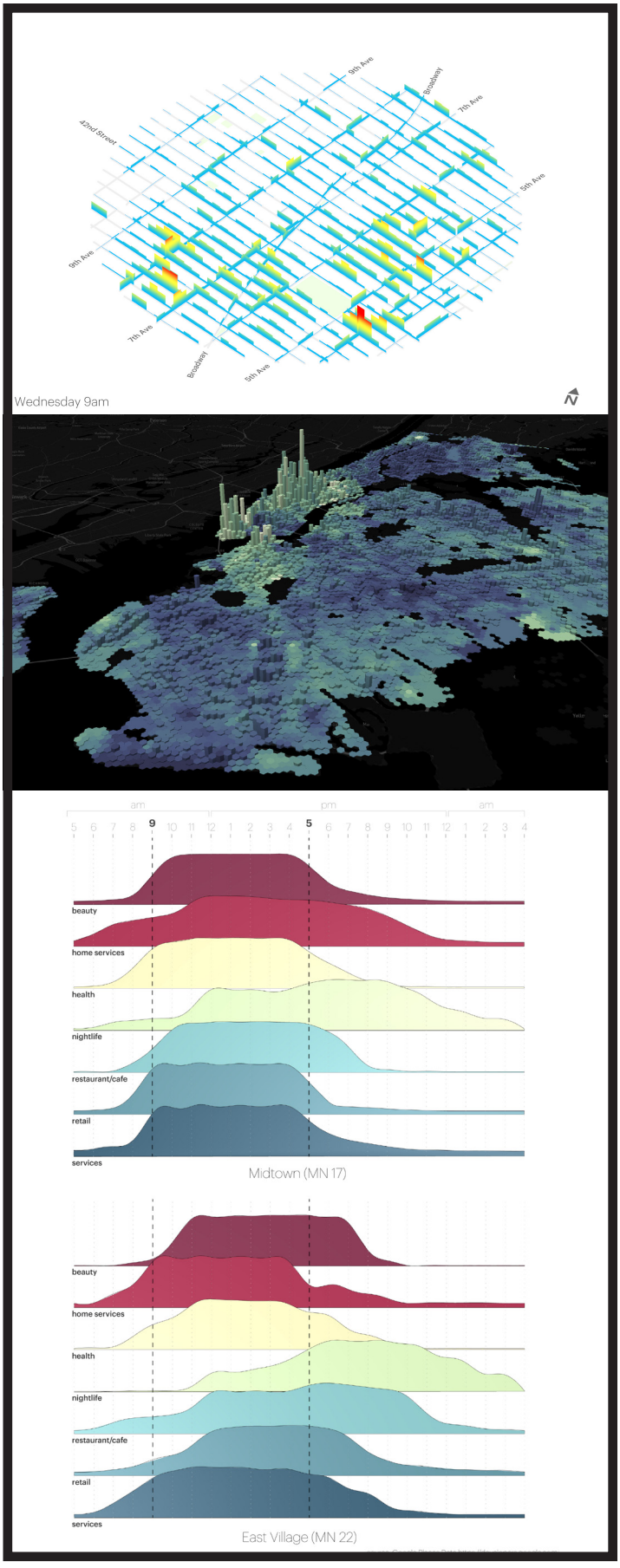
Course Goals
- Gaining literacy with urban data
- Understanding history of urban data visualization
- Learning techniques for collecting, analyzing, and visualizing data
- Constructing data driven narratives
- Utilizing collaborative models for policy, planning, and design
- Understanding the relationship between NYC zoning, development, and the built environment.

Technical Workflow
- Data collection, Studying MetaData
- Cleaning , Pairing, and Data Field Calculation
- Data Exploration
- Create new data set(s) based on data exploration and project goals
- Explore new data set to establish project, Visualize Data to guide narrative. (Statistical Historiography.)
- Develop and Vet Impact Models (Making the Rules)
- Linking financial models to spatial models
- Test spatial impact of scenarios. (Following the Rules)

Techniques
We understand students come from different backgrounds and have various technical skills. We will provide tutorials that will cover the technical workflow through a variety of softwares (e.g. QGIS, ArcGIS, Grasshopper, Excel, Python, web mapping) to both accommodate these differences as well as provide opportunity for acquiring new skills.
- Data collection, cleaning and merging: python, grasshopper, ArcGIS, QGIS or excel.
- API querying: Twitter and Flickr
- Spatial Analysis: ArcGIS, QGIS or Rhino/Grasshopper
- Web Mapping: MapBox.
- Visualization: ArcGIS, QGIS, or Rhino/Grasshopper.



PLUTO landuse data representing 1 minute walk times sized by built area



Google Places Data. Top: Number of open business per street segment. Middle: Open business aggregated by hex bins in MapBox. Bottom: Comparison of open businesses in Midtown Manhattan and the East Village by business type.

Partial List of Data Sets

Open Data Sets

- PLUTO Data
- Department of Finance Sales Price Data
- Uber Data
- 311 Complaint Data - Has 2010 to present as well as data for 2004 - 2009.
- Building Energy Data - From 2011 - 2015
- Subway Station Locations
- Subway Entrance Locations
- Building Permit Filing - Current and historic data
- Restaurant Inspection Results.
- DOB Job Application Filings
- DOB Permits Issued
- DOB Stall Construction Sites
- Citi Bike Data - Based on trips taken
- MTA Bus Stop Locations
- Perceived safety
- DOF Tax Document Info, including rent stabilized Apartments
- AirBnB Data
- Liquor Licenses
- Weather Data by Zip Code
- Inclusionary Housing Zones (shapefile)
- Housing Development and Preservation (HPD) data on affordable units
- Rent Stabilized Apartments

Custom Data Sets

- 2015 merged with Department of Finance Sales Data + Pluto Data
- All Streeteasy Data up to Fall 2016
- NYC Twitter Data - 2015
- NYC Google Places Data - 2018