A4815 - X-Information Modeling 1

A4829 - X-Information Modeling 2

Instructor: Luc Wilson
Thursday | 9-11am | Room Avery 115

Data is the language of cities. It is used to communicate and make decisions. This data is inherently spatial. As designers and planners we are uniquely suited to generate and use spatial data in the design of better buildings, public spaces, and cities. This course will introduce students to a unique data-driven, design analysis workflow: parametric massing design -> custom tool building -> iteration -> evaluation. This course will primarily use Grasshopper for Rhino with a range of plugins for grasshopper.

The course will be structured in four parts:
Session A: 1) Learn the workflow, 2) Develop new analysis tools,
Session B: 3) Integrate and work with urban data, and 4) Develop your own project.

The techniques and workflows introduced in this course are applicable at a variety of scales; at its core this class is about creating tools to measure performance, drawing with data and visualization for decision making. The final project can focus on any aspect covered in the class from designing new spatial metrics, to data visualization, to developing performative zoning/policy, to deploying data-driven building types across the city.

Students must know some Rhino. Grasshopper proficiency is not required, but a basic understanding will help. Session A is required for Session B unless you are a grasshopper wizard. You may work independently or in teams, although if you are new to grasshopper working in a team is highly recommended.

Grading for each session will be 30% attendance, 30% weekly assignments, and 40% for the final project.
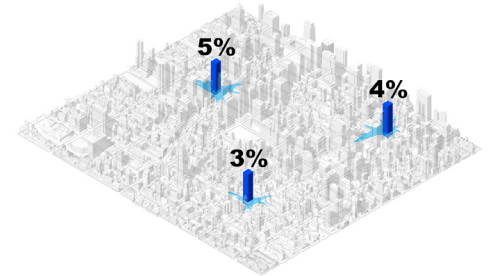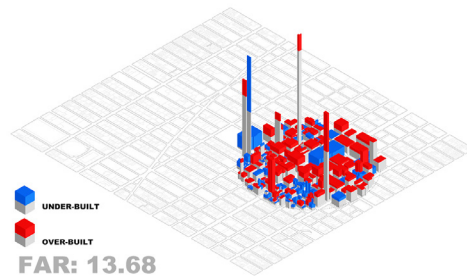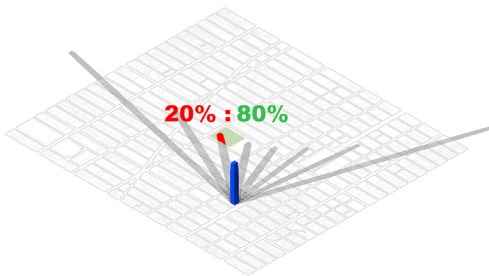
Session A
Massing, Tool Building, and Iteration

In session A students will focus on learning the fundamentals of the integrated XIM methodology. This will include building parametric massing tools, custom analysis tools, iterating hundreds to thousands of options, and ultimately, using data for design decision making.

Session A schedule
Week 1: Introduction to spatial evaluation techniques
Week 2: Basic parametric massing
Week 3: Introduction to iteration, data collection, and evaluation
Saturday Help Session
Week 4: Review assignment 1a
Week 5: Data visualization and metric dashboards
Week 6: Data exploration tools
Week 7: Review assignment 1b

PROJECT MASSING

DIRECT DAYLIGHT PLAZA   DIRECT DAYLIGHT FACADE   BUILDING PROXIMITY   SKY EXPOSURE   STRATEGIC VIEWS

DAYLIGHT HOURS PER OPEN SPACE AREA   DAYLIGHT HOURS PER FACADE AREA   DISTANCE BETWEEN BUILDINGS   PERCENTAGE OF OPENNESS TO SKY   AREA WITH VIEW
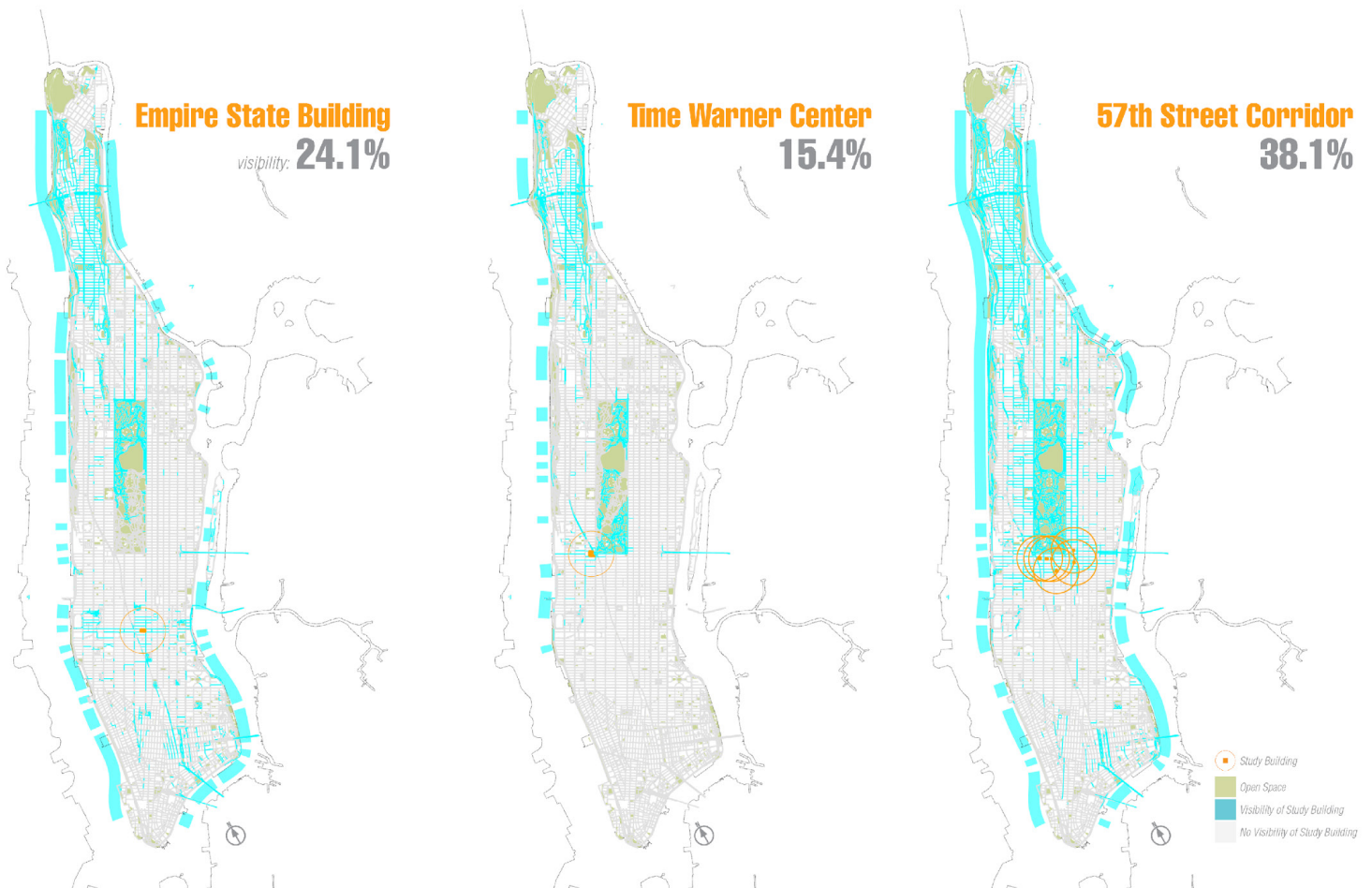
DESIGN ANALYSIS SYSTEM
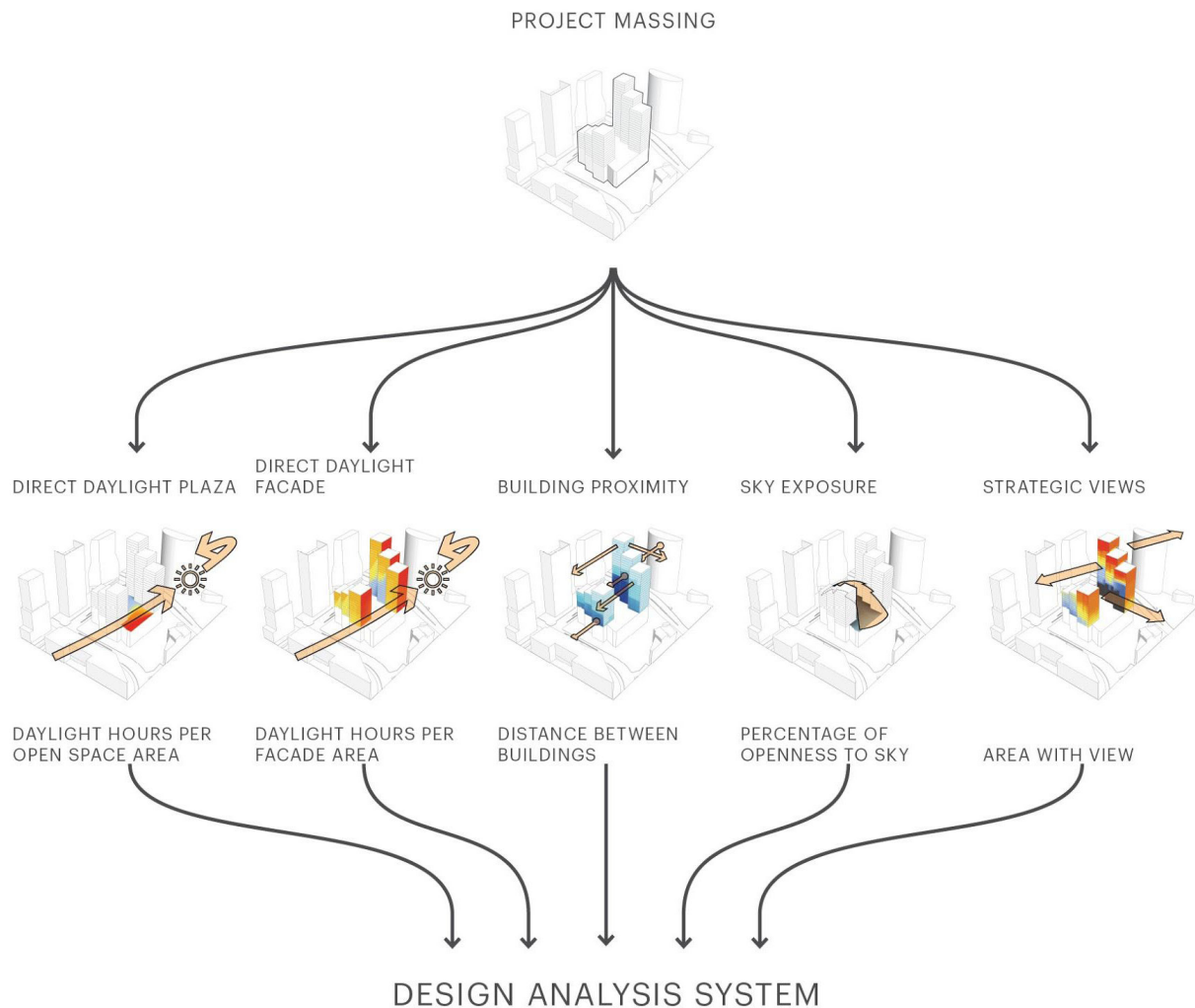
Session B
Urban Data & Final Project

The first half of session B will advance the topics of session A (evaluation techniques, parametric massing and iteration) and introduce grasshopper techniques focused at the city scale. Urban data such as geo-tagged data sets, including GIS, PLUTO, 311, Twitter, and Flickr, will be joined in grasshopper and used for city level analysis. In the second half of the session B students will develop a final project out of any aspect covered in the course.

Session B Schedule:
Week 1: Pairing external geo-located data sets with evaluation tools
Week 2: Urban filtering, evaluation and urban parametric massing
Saturday Help Session - November 5th
Week 3: Review assignment 2 and final project proposal
Week 4: Advanced visualization techniques
Thanksgiving
Week 5: Custom workflows
Week 6: Individual project desk crits - coordinated around final reviews
Week 7: Final Review

Empire State Building
visibility: **24.1%**

Time Warner Center
15.4%

57th Street Corridor
38.1%

Study Building
Open Space
Visibility of Study Building
No Visibility of Study Building

Final Project

At this point in the class, you have been exposed to an arsenal of information modeling strategies, logics, and techniques. Any combination of these tools can be applied to all architectural and urban challenges. For the final assignment, your will propose and carry out your own implementation of information modeling as presented in this class. Below are example techniques and project types reference as the framework for formulating your own design challenge. All projects are required to have a thesis or be guided by a clear scenario that reflects the assumptions about metrics and data that are ultimately used. Your project will be the culmination of those judgements you make.

Techniques and Concepts

- Parametric Massing
- Parametric Transformations
- Ray Casting
- Shadow Casting
- Subdivision Analysis
- 3D Spatial Analysis
- 2D Spatial Analysis
- Metrics Dashboard
- Composite Metrics
- Derivative Data
- Evolutionary Optimization
- Multi-Objective Optimization
- Data Filtration/Evaluation
- Image Sampling
- API Query

Project Types

- Metrics Design
- Cartographic
- Deployable Type
- Data Visualization
- Historic Evaluation
- Facade Component
- Building Design
- Urban Design
- Urban Speculation
- Performative Zoning/Policy