

DTEQ: Digital Techniques of Urban Design

Columbia University GSAPP, Summer 2017

Course Description

The course is held as a series of workshops throughout the semester, each typically lasting 9 hours (2 4.5 hour sessions), coinciding with the assignment of projects in the studio. Weekly office hours with the digital assistant will be held in studio from 4-6 on Tuesdays.

The course work will largely be self directed, following video and web tutorial documentation. The tutorials are to be used as a means to create drawings concerning studio projects, and not ends in and of themselves.

An objective of the course is to “learn how to learn” new techniques in an age of abundant online documentation. Knowing how to search for tutorials on the web, and how to adapt them to specific projects is an invaluable skill.

In addition, the course will focus on “interoperability,” or how students can leverage multiple software platforms to produce ideas, spaces, and representations. Each workshop engages more than one software, and focuses on producing deliverables across many platforms.

The use of multiple software platforms and representational media will allow students to address both material and immaterial design concerns confronting the contemporary city. Each workshop engages a different theme: Starts, Sites, Systems, Spaces, Stories. Students will represent cities in different ways in each workshop. Starts will emphasize 3D sketching, developing formal languages, and basic graphic conventions. Sites will introduce practices of critical mapping. Systems will ask students to represent multiple scales, quantities and times. Spaces will revisit 3D sketching and form making, as well as introduce rendering. Stories will introduce a broad set of image production techniques and mediums. Each workshop will be taught by a subject matter expert, who will share a professional project relevant to the material to be covered as a provocation.

Instruction Team

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Lindsey Wikstrom	Subject Matter Expert	Stories	lmw2167@columbia.edu

Course Goals

- Support the studio process and design thinking by cultivating a 'workflow' model of practice among the students
- Enable students to use multiple software platforms to address particular design questions, not visualization techniques
- Enable students to learn at their own pace using self-directed tutorial documentation in addition to periodic desk crits during a workshop format
- Platforms taught during DTEQ include: Rhino, Grasshopper, ArcGIS, 3DS Max, Photoshop, Illustrator, InDesign, V-Ray

Course Schedule

June 03	12:00-6:00	Workshop	Starts	Avery 114
June 06	4:00-6:00	Office Hours	-	Studio
June 13	4:00-6:00	Office Hours	-	Studio
June 16	10:30-2:30	Guest Lecture	Sites	Avery 114
June 17	10:30-2:30	Guest Lecture	Sites	Avery 114
June 20	4:00-6:00	Office Hours	-	Studio
June 27	4:00-6:00	Office Hours	-	Studio
June 30	10:30-2:30	Workshop	Systems	Avery 114
July 01	10:30-2:30	Workshop	Systems	Avery 114
July 04	-	Holiday	-	-
July 11	4:00-6:00	Office Hours	-	Studio
July 14	10:30-2:30	Workshop	Spaces	Avery 114
July 15	10:30-2:30	Workshop	Spaces	Avery 114
July 18	4:00-6:00	Office Hours	-	Studio
July 25	4:00-6:00	Office Hours	-	Studio
July 28	10:30-2:30	Workshop	Stories	Avery 114
July 29	10:30-2:30	Workshop	Stories	Avery 114
TBD	TBD	Final Review	-	TBD

Submitting Work

Workshop deliverables are to be completed by the end of each workshop and pinned up in 11x17 format. Opportunities to revise and resubmit work by the Tuesday following the workshop will be given, at which point students are to make a final submission of high resolution JPGs to Courseworks as well as to

Instagram with the tags #dteq2017 #studentwork. Students will maintain an 11"x17" document of all submissions for this course to be presented during the final review.

Starts Workshop

June 3: 12:00pm-6:00pm

Tiffany Rattray, Expert: tar2124@columbia.edu

Workshop Overview

At the end of this workshop, students should be comfortable creating and transforming geometry in Rhino using basic commands, exporting drawings to Illustrator to control linework and color, and placing drawings in an InDesign file for printing and sharing.

Virtual worlds

The 3D modeling environment should be thought of as a virtual copy, or simulacrum, of the world that we live in. Space in this virtual world is described through cartesian coordinates, organized on x,y, and z axes. This is a departure from the conception of architecture as an "accumulation of partial representations"(Allen, 2000). While Rhino is a drawing tool, built upon renaissance modes of perception, namely orthography and perspective, it is the speed of the computer to construct these 2-dimensional projections as fast or faster than your body perceives reality. In a way, Rhino and your computer are like drawing power tools. Still, these representations consist of the familiar points, lines, and planes.

Objects and actions

The collapse of accumulated representations into a simulation of reality allows us to be concerned with the nature of objects and their means of making, as opposed to the construction of images alone. Because of this, 3D modeling softwares emphasize action as a way to affect objects as a means of designing them. Moreover, these actions are often derived from practices of fabricating objects (extruding, revolving, lofting, matching, etc.) So, while the act of drawing lines and projecting are still important to constructing representations of design, they are no longer the principal means of designing. Students should take this workshop as an opportunity to encounter a new vocabulary of making forms through these actions, and to recognize how this vocabulary might affect the performance of those forms as objects.

Families and resemblance

As new formal vocabularies emerge, students should record the means by which they are produced, and attempt to name, collect and organize how the means might relate to one another.

Schedule

12:00-1:00 Introduction Avery 114

1:00-5:00 Tutorial time Studio

5:00-6:00 Pin up Avery 115

Tutorials

User interface and navigation

- [Command Line](#)
- [Viewports](#)
 - Top, Right, Front, Perspective
 - Pan, Orbit, Zoom
 - Organization (Maximize, axes, grid)
 - [Basic display options](#)
- [Units and tolerance](#)
- Selecting geometry

Geometry basics

- Points, Lines and curves
 - [Point, line, polyline, control point curves, interpolated curves, circle, arc](#)
 - [Open, closed curves](#)
 - [Object snaps, ortho, tab](#)
 - [Explode, join](#) and [offset](#)
 - [Trim, split, extend, fillet](#)
 - [Text](#)
- Objects from curves
 - [Extrusions, slab](#)
 - [Revolutions](#)
 - [Planar surfaces, extruding surfaces](#)
 - Loft, sweep, pipe
- [Primitive objects](#)
 - Platonic solids (box, cylinder, cone, pyramid, sphere)
 - Explore! Create 6 objects using a mix of objects from curves and primitives, use text to record the commands used
- Transforming objects
 - [Move, Copy, Scale, rotate, rotate 3D](#)
 - [Sub-object selection and transformation \(ctrl+shift\)](#)
 - [Bend, twist etc](#)
 - [Offset surface, trim, split](#)
 - [Explore! Transform your primitives, append your text to include the transformations](#)
- [Working with solids](#)
 - Open and closed surfaces and polysurfaces (showedges)
 - Boolean operations
 - Filletedge, shell, cap, mergeallfaces, extract surface
 - Explore! Further transform your objects, continue to append your transformations in text

Cameras, Views (forthcoming)

- Parallel versus perspective views, lens length
- Naming and saving views
- Clipping planes
- View captures
- Explore! Save an overall parallel projection view of your family of objects, an experiential view of them from ground level, and a section through one of them using a clipping plane

Model Organization (forthcoming)

- Layers, properties, blocks, groups, hide, lock

[Drawings](#)

- Make2D
- Lineweights by layer: cuts, edges, profiles and hidden lines
- Exporting your overall parallel projection view to Adobe Illustrator

Working with drawings in Illustrator

- Artboards
- Geometry creation and transformation
 - Pen tool
 - Direct selection
 - Bounding box
 - Text
 - Scale figures
- Strokes
 - Weight
 - Pattern
 - End type
 - Arrowheads
- Fills
 - Color
 - Gradient
 - Patterns
 - Swatches
- Effects
 - Opacity, blending modes
 - Drop shadow
 - Round corners
- Working with Geometry from Rhino
 - Layers and selection
 - Live Paint Groups
 - Shading faces
 - Explore! Make a matrix drawing of your family of objects from Rhino with lineweights, colors and text on an 11x17 artboard

Preparing work for printing with InDesign

- Pages
- Placing assets
- Links
- Text
- Exporting for distribution

Deliverables

Family of resemblant 3D sketch objects, 3 views

Working individually, organize the objects you made while sketching during the exploration segments of the tutorials. Do they relate to one another? If so, how? Arrange them as a matrix including the text and produce 3 drawings exploring their potential as forms and spaces. These drawings should read as a coherent series, should not aim to be photorealistic, and should definitely not be boring. Experiment with color, text, lineweight, gradients and patterns to communicate, abstract, and play. All objects are to be produced in Rhino, all drawings are to be finished in Illustrator. Each drawing should be fit to an 11"x17" sheet.

- **Overall 'axo' view of entire family** This drawing should show the entire family from an overall axonometric view, as well as text describing the commands that created and transformed the objects. The drawing should use lineweight, color and text in a coherent way to define the objects as a family. It should be well crafted and well composed.
- **Experiential view of one object** This drawing should use a perspective view to suggest how one of the objects might be experienced from the point of view of a person. Use scale figures, color, a

horizon line and a gradient sky to give the drawing a sense of scale. Again, the drawing should be well composed and well crafted.

- **Section view of one object** This drawing should use the clipping plane to create a section cut through an object, describing interior space. It should use correct lineweights, thickness and color to depict the section cut, and use a ground plane to suggest a relationship to a site. Don't forget scale figures!

Sites Lecture

June 16-17: 10am-2:30pm

Grga Basic, gb2559@columbia.edu, Center for Spatial Research

Juan Francisco Saldarriaga, jfs2118@columbia.edu, Center for Spatial Research

Lecture Overview

- Mapping as a critical practice
- What is geospatial data?
- Making the invisible visible
 - 2D and 3D symbology
- Analyzing data
 - Calculations
 - Spatial analysis
- What kind of data is available to us?
 - G Drive
 - NYC Open Data
 - Etc.
- Bringing that data to the design environment
- Mapping as Project
- Caveats/pitfalls of geospatial data

Schedule

Friday June 16

10:30-12:30 Introduction and demo Avery 114

11:30-2:30 Tutorial time/group meetings Studio

Saturday June 17

10:30-1:00 Project time Studio

1:00-2:30 Pinup Avery 115

Tutorials

The Columbia Center for Spatial Research has a series of open source tutorials that cover basic techniques of critical mapping. Students should complete several introductory tutorials, and identify advanced tutorials that support research being done in studio projects.

[Connect to the X drive](#) (Everyone)

[Creating a basic map in ArcMap](#) (Everyone)

[Downloading and displaying census data from American FactFinder](#)

[Data Types and 311 Data](#)

[Analyzing Data](#)

[Creating a 3D site model in GIS](#)

[Exporting 3D data and importing in Rhino and 3DS Max](#) (Everyone)

[Importing GIS data into Grasshopper](#)

[Other tutorials](#)

Resources

[Possible data sources](#)

[Other tutorials](#)

Deliverables

Series of maps, 2 per student

Working individually, produce two maps using ArcGIS, each at different scales that feature your site. These maps should consist of base layers describing physical features, as well as analytical layers that symbolize other data. Coordinate your maps with those of your group members so that together, your work can be read as a series that use GIS data to construct an argument or help discover something about your site. Fit your maps to 11x17 sheets.

- **Macro scale map** Make one map at either the city or borough scale. Compare conditions in your site to nearby neighborhoods or to the city at large. Use field calculations or overlays of at least two sets of data to construct an argument.

- **Meso scale map** Make one map at the neighborhood scale. Test a symbology format other than graduated colors to represent the distribution of some data within the neighborhood.

3D massing model of site, 2 views

Working in your studio groups, make a comprehensive 3D massing model of existing buildings and other physical features such as streets, topography or orthoimagery and export it to Rhino. Each student is to produce 2 screenshots of the model, fit to a single 11x17 sheet.

- **Experiential view** Choose an interesting view from a human perspective of your site. Consider what information is being communicated and emphasized in the view.
- **Aerial view** Choose an interesting view of your site from above. Consider what information is being communicated and emphasized in the view.

Systems Workshop

June 30-July 1: 10am-2:30pm

Andrew Heumann, Expert: adh2172@columbia.edu

Workshop Overview

The goal of this workshop is to develop a facility with parametric modeling - connecting the skills and concepts built in the Starts + Sites workshops, enabling efficient modeling, highly customizable graphical visualization, and interaction with various static + dynamic data sources.

Objects versus Systems

Thinking in terms of discrete, withdrawn elements can be a useful perspective to interrogate things-in-themselves; however, it is also necessary to perceive (and model) how elements interact to compose systems, networks, fields, multitudes, and totalities. At its best, system-oriented thinking can address, interrogate, and model relations, generalities, and emergent properties in aggregate; at its worst it runs the risk of being reductive, totalizing, and obscuring specificity and uniqueness.

Code as Representation

The nature of algorithmic code is that — like a drawing, or physical model, or textual description — it functions as a system of representation in and of itself. Like any representational or poetic medium it contains and distills ideas and intentions: literally encoding them as models, methods, systems of abstraction that reflect an outside world. Unlike other representational media, its mechanism of action is literal rather than figuratively interpreted or performed. Code is executed autonomously, and the representation can be effectively infinitely repeated in response to dynamic criteria, or parameters. All of a sudden, the object can be thought of as a circumstantial output of a designed process, as opposed to a designed object.

Algorithmic Literacy

There exists almost no discipline or domain that has not been altered by the ubiquity of computation and digital systems. To be merely a user of such systems is like being able to read but not write. To

understand and critically reflect on a world increasingly guided by algorithmic logic, it is imperative to learn at least the fundamentals of how such logics are authored.

Schedule

Friday June 30

10:30-11:30 Introduction Avery 114

11:30-2:30 Tutorial time/group meetings Studio

Saturday July 1

10:30-1:00 Project time Studio

1:00-2:30 Pinup Avery 115

Tutorials

As in previous workshops, students should search for tutorials that are relevant to their sites and projects, mobilize and expand on those techniques with help from instructors and teaching assistants to produce final deliverables.

Thinking Parametrically

- [Introduction to parametric thinking in the Grasshopper interface](#)
Source files: [Download](#)
 - Modeling vs. Coding vs. Visual Scripting - what's the difference?
 - The Hierarchy of geometry - Numbers, Points, Vectors, Planes, Curves, Surfaces, Polysurfaces, and Meshes - Composition + Decomposition
 - *Explore! Try to familiarize yourself with the interface, see what components are available and try to figure out what they do.*
- [Working with Data](#)
Source files: [Download](#)
 - Understanding lists and data structures
 - Manipulating data structures
 - *Explore! Try to create 5 different 2d shapes, extruded to 5 different heights, without using copy-paste*
- [Toolcrafting - Interacting with Rhino](#)
Source files: [Download](#)
 - Installing 3rd party plug-ins
 - Loading geometry from Rhino - statically and dynamically
 - Creating geometry in Rhino
 - Creating custom tools to speed up modeling
 - *Explore! Take your 3d sketch objects from the "Starts" workshop and see how you can load them in and manipulate them in Grasshopper.*

Geographic Systems

All source files: [Download](#)

- [GIS in Grasshopper - Introduction to Heron and Herman](#)
 - Loading SHP files + parsing embedded data
 - Working with Coordinate Systems - Lat/Lon to world XYZ coordinates

- [Beyond geometric data sets - connecting to Excel](#)
 - Working with external data sets
 - Matching / Lookups / Data operations
 - Writing data to Excel
- [Data Visualization - Graphics with Grasshopper](#)
 - Representing “Hard” systems - points, solids, color-coding, lineweights
 - Representing “Soft” systems - point clouds, 3d graphs, contours, meshes
 - Extracting hi-res graphics from Grasshopper
 - Grasshopper to Illustrator workflows
- [Introducing Web-based data sources](#)
 - Working with APIs pt1 - Local Data from Yelp
 - Working with APIs pt 2 - Local Data from Walkscore
 - Working with APIs pt 3 - Routing w/ Google Maps

Drawing Codes - Modeling with Logic

- [Systemic Urban Landscapes](#)
Source Files: [Download](#)
 - Attractor logic - from points to curves to fields
 - Conditional logic - If/Then rules and selective processing
 - Introducing controlled randomness
 - From simplicity to complexity - Achieving model detail from lightweight “skeletons”
- [From “Code” to Code - Modeling a zoning envelope](#)
Source Files: [Download](#)
 - Modeling Setbacks + Stepbacks with Boolean operations
 - From Mass to Building - modeling and measuring floors
 - Advanced Conditional Logic - interpreting and implementing rules
- [Automating Documentation - Advanced Graphics + Capture](#)
Source Files: [Download](#)
 - Slider animation
 - Camera control
 - Automatic view capture + control

Deliverables

1 multiscalar static data visualization drawing, 1 dynamic “future projection” (animation or interactive)

Working individually, employ the techniques covered in the tutorial sessions to produce two representations of your site.

- **Visualization of immaterial present conditions** This static drawing should take advantage of available data to build an argument about some condition(s) of your site. Explore traditional data sources like CAD and GIS, but also see what useful data can be retrieved from the web, from satellite imagery, from twitter, from scanned maps, from text files, etc. Use this data to investigate the intangible conditions of the site and its context, and then create a data visualization to graphically represent those conditions. The visualization should address multiple scales, and exceed (or subvert) strictly geographic/geometric/cartographic conventions in its presentation. Most importantly, it should convey an idea, position or argument through the data it presents. The drawing should be fit to an 11x17 sheet.
- **Dynamic exploration of possible future conditions** Engage in some speculative design fiction to explore a possible future for your site and its surroundings. What might the future look like if height regulations were different? Under radical sea level rise? In a world without above-ground vehicular transport? Create either an animation or an interactive tool to explore the urban consequences of such a change. You can explore time as a variable, but also consider what other variables might alter the outcomes of your future scenario. Even though the medium is different, your tool or animation should take as much care with graphic styles and visual craft as

your static drawing. The representation should be uploaded as a video to Courseworks, as well as Instagram or Youtube, or presented on a series of stills on 11x17 sheets.

Spaces Workshop

July 15-16: 10am-2:30pm

Trevor Lamphier, Expert: til2104@columbia.edu

Workshop Overview

The goal of this workshop is to develop 3D modeling and visualization skills at the outset of the final design problem in studio. At the completion of the workshop, students should feel comfortable modeling complex, generative geometries, easily move between more diagrammatic forms to buildings and their associated components, and be able to simulate basic material finishes and lighting environments in their models.

Schedule

Friday July 15

10:30-11:30 Introduction Avery 114

11:30-2:30 Tutorial time/group meetings Studio

Saturday July 16

10:30-1:00 Project time Studio

1:00-2:30 Pinup Avery 115

Tutorials

As in previous workshops, students should search for tutorials that are relevant to their sites and projects, mobilize and expand on those techniques with help from instructors and teaching assistants to produce final deliverables.

Advanced geometry creation

- Advanced Rhino UI
 - [Rhino Options \(Autosave and Aliases\)](#)
- Push + Pull: Soft manipulation of planes in Rhino
 - Complex surface generation
 - Curves ([line](#), [polyline](#), [interpolated curve](#), [nurbs curves](#))
 - Surfaces ([extrude](#), [loft](#), [sweep1](#), [sweep2](#), [network srf](#))
 - Thickening and Blending ([offset srf](#), [blend crv](#), [blend srf](#))
 - Building on Surfaces ([Split](#), [Extrude](#), [Contour](#), [SetPt](#))
 - Curvature management ([control points](#), [rebuilding](#), [analysis](#))
 - Deformations by data ([height fields](#), [point clouds](#), [drapes](#))

- Subdivide + Conquer: Quick subdivision and modifier use in 3DS Max and Rhino+Grasshopper
 - Introduction to Sub Division modeling ([interface](#))
 - Basics of 3D Max ([edit poly, modifiers](#))
 - Minimal Surfaces ([edit poly, relax](#))
 - Complex Geometry- [keeping it "live"](#)
 - Fun modifiers ([basic guide to 3D Max modifiers](#))
 - [Quickly go between 3DS Max and Rhino](#)
 - Surface subdivision types in Grasshopper and adjustment with sliders ([LunchBox](#))
- Pattern Making: Controlling analytical and generative patterns in Rhino and Grasshopper
 - Drawing fields
 - ([Tween curves](#), tangents, normals)
 - ([array, arraycrv, arraysrf](#))
 - Grasshopper based distribution
 - [Curve based](#)
 - [Surface Based](#)
 - [Blocks](#)
 - Component aggregation ([Grasshopper](#))

Refining forms into architecture

- Refinement of complex surfaces into envelopes:
 - Polysurface Editing ([twist, taper, maelstrom](#))
 - Thickness and layering ([offsetting, extrusions, managing corner conditions](#))
 - Making surfaces occupiable ([contouring, setpt, splitting, etc.](#))
 - Making apertures ([projection](#), booleans)
- Producing structure and other elements
 - [Floor slabs with manually and with Grasshopper](#)
 - [Column grids, cores and propagation](#)
 - Truss modeling with Grasshopper ([LunchBox](#))
 - [Stairs](#)
 - Structural skins with Grasshopper ([LunchBox](#))

Making drawings and images

- Simulating materials
 - Basic texture mapping in Rhino or V-Ray or Max ([Intro](#) and [Part 1](#))
- Simulating environments
 - Making sharp shadow renderings with Rhino sunlights and V-Ray render ([Part 2](#))
 - Making soft shadow renderings with Rhino or V-Ray skylight ([Part 2](#))
 - [Ambient occlusion](#)
 - Output and camera controls in V-Ray ([output settings, camera controls](#))
- Advanced drawing types
 - Setting up a cut-away section ([make2d, split, clipping plane, export to AI](#))
 - Exploded axonometrics ([named positions, make2d, export to ai](#))
- Vector drawing output
 - [Make2D, Lineweights as template layers, Export to Illustrator](#)
 - [Photoshop and Illustrator overlays](#)
- "Fake 2D," fast vector drawing approximation
 - Control of custom [display modes](#), setobjectdisplaymode, [viewcapturetofile](#)

Deliverables

3D Transect of your site, 1 view annotated as necessary

Working individually, each student is to select a 'transect,' or strip of their site in studio. When combined with other group members, the models should produce a comprehensive 3D model of your site. The

purpose of the drawing is to describe the physical experience of how the city meets the water within your site, and how your design projects shape this experience. [Examples](#)

- **Sectional Axo view of transect** Compose an axonometric or perspectival view of your transect. The drawing should include: Topographical Information, Hydrographic/Tidal information, Urban infrastructure (streetscapes, underground systems, transit, various features), Surrounding buildings, Landscape, Ownership/Use/Policy, Atmosphere, Structures and tectonics. Fit to an 11x17 sheet.

Revised family of resemblant 3D form, 1 view

Working individually, each student is to revisit the family of resemblant 3D forms from the Starts workshop with new tools. Students should begin to add scale and relationships to the city and human body in this study, and should consider their potentials as design elements, not just abstract forms.

- **Taxonomy of advanced geometries** Produce a matrix of geometries using new tools that could be of potential interest in your final design proposal. You may produce 6 forms that explore how different geometries can solve the same design problem, or how a family of related forms can solve different design problems. Fit to an 11x17 sheet.

Stories Workshop

July 28-29: 10am-2:30pm

Instructors:

Lindsey Wikstrom, Expert: lmw2167@columbia.edu

Workshop Overview

The goal of this workshop is to develop immersive visualization skills in order to recompose three final images from your studio site that effectively communicate your concept and design. These drawings will draw together knowledge from the past workshops, pulling everything you've learned together into a final effort. The purpose of immersive drawing is to bring the viewer with you into the content of the design so that the features that you are trying to communicate become a tangible experience.

The drawings should include:

- Multiple scales
- Multiple layers of information (physical form, annotation, atmosphere, etc)
- A sense of narrative and discovery (a beginning, middle, and end, etc)

Schedule

Friday July 28

10:30-11:30 Introduction Avery 114

11:30-2:30 Tutorial time/group meetings Studio

Saturday July 29

10:30-2:30 Project time/group meetings Studio

Tutorials

As in previous workshops, students should search for tutorials that are relevant to their sites and projects, mobilize and expand on those techniques with help from instructors and teaching assistants to produce final deliverables.

Photoshop + Illustrator

- Workflow Example
 - [Rhino to Photoshop to Illustrator and back](#) (channel management, layering)
 - [Rhino Screenshots](#) (scale, material UV maps, reflection and environment)
- Photoshop Editing
 - Color Tone (daytime, nighttime, exposure, brightness, contrast, etc)
 - Blending Modes (multiply, screen, hard light, soft light, etc)
 - Filters (blur, pixelate, noise, stylize, etc)

Animating

- [AfterEffects](#)
 - Story Boarding
 - Base Narrative (desired effect, plot, point of view)
 - Frames (timing, scale, composition)
 - Importing into aftereffects
 - Channel management
 - Exporting (Render settings, quality, devices)

Designing in 360

- Iterating between tools
 - [Grasshopper + Rhino](#) (unrolling, baking, layer management for editing)
 - [Rendering in Vray](#) (camera POV, settings, set atmosphere, channels)
- Post Production
 - Entourage + Atmosphere (picture frames, mesh people, photoshop)
 - Formatting for Devices (phone, google cardboard, website)

Workshop Final Deliverables

Cartoon of final drawings, 3 views

Working in your studio groups, produce sketches of 3 drawings you intend to revise from earlier in the semester for your studio final review. Include narrative sequence, multiple scales, and inventive use of all the techniques learned this semester.

- **Cartoon 1: Analytical drawing** Plan an analytical drawing for your final project that discovers something about your project or site in service of an argument. Fit on an 11x17.
- **Cartoon 2: Experiential drawing** Plan an experiential drawing, or composition of multiple experiential drawings that demonstrates how your project is experienced. Fit on an 11x17.
- **Cartoon 3: Wildcard drawing** Plan a drawing that needs an alternative format to be presented. Perhaps an animation, physical model, website, sound, or other. Consider what software you will need to use and in what sequence, it should be one of your own invention, and not given by the tutorials. Fit on an 11x17.

DTEQ 2017 Final Deliverables

Exhibition quality drawings of studio project, 3 works

Working individually, complete your proposed drawings from the Stories workshop.

- **Analytical drawing** An analytical drawing, or composition of analytical drawings that discovers something about your project or site in service of an argument. Final drawing to be no smaller than 22"x34"
- **Experiential drawing** An experiential drawing, or composition of multiple experiential drawings that demonstrates how your project is experienced. Final drawing to be no smaller than 22"x34"
- **Wildcard drawing** A drawing that needs an alternative format to be presented. Please consider the presentation format and make available to you the tools you will need to present it at the final review. No size restrictions.

Documentation of wildcard workflow

Working individually, document how your wildcard drawing was made. Should take the form of a web or video tutorial, or short white paper. Documentation to be contributed to future semesters of the course.

- **Documentation of wildcard workflow**