

Introduction to Digital Skills

August 13 – 17, 2012 10 am* – 5 pm, Gund 111
August 20 – 23, 2012 10 am – 5 pm, Gund 112

***begins at 9 AM on August 13**

This course is intended to introduce incoming students to the software resources, workflow processes, and conceptual expectations within the GSD. There are no pre-requisites for this course as it is intended to facilitate a smooth transition for students of all levels and abilities. Throughout the 1.5 weeks, you will work through a series of related exercises to become familiar with the programs, work efficiently across platforms, model building using the GSD Laser facilities and have a warm up for the issues you will be exploring at the GSD.

Those arriving with no or limited knowledge of software used to generate or represent architecture will gain exposure to the tools and techniques most commonly used at the GSD. Students arriving with extensive software knowledge will be able to familiarize themselves with the internal structure and resources of the GSD. Most importantly, the purpose of the class is to prepare you to be productive in studio from the first day forward. In addition to technical skills, the course will discuss topics, issues, and concepts that you will encounter. This will reinforce your ability to immediately engage with your projects and professors.

Computer/Software Requirements

By Monday August 13, you must have:

- Laptop Computer with a Windows based operating system*
- *Note: A Mac with Windows is ok. (see below)

Recommended specifications:

- Dual core processor (2GHz or higher)
- At least 2GB RAM
- Strong graphics card capable of displaying at least 1024 x 768 resolution with true color
- 1GB of dedicated memory recommended

For more information on computer recommendations visit: <http://www.gsd.harvard.edu/#/gsd-resources/computer-resources/your-computer.html>

***NOTE TO MAC USERS:**

If you are planning to use a MacBook or MacBook Pro you must have a dual-boot environment (Bootcamp or Parallels) to accommodate the GSD's dependency on Windows-only compatible software. You must purchase Windows and install it. Directions for installing Windows onto your Mac are available from your dual-boot environment software. Do not arrive with the expectation that the help desk will install and configure this environment for you. Your computer is your responsibility. Help Desk is available for specific questions only. A windows-based laptop (e.g. Dell, Lenovo, etc.) has proven to be a lower maintenance environment for design computing.

Software

- Rhino 4.0 (available to download from the GSD local network)
- AutoCAD (available to download from the GSD local network)
- Adobe Photoshop (must be purchased independently)
- Adobe Illustrator (must be purchased independently)
- Adobe InDesign (must be purchased independently)

GSD Licensed Software

- Obtaining the most recent version of the software is not critical for the class but might be beneficial later in the semester depending on your class selection. The Computer Resources Department provides 'network licensed' software, which all members of the GSD community are welcome to use.

Adobe Creative Suite

- The one exception to the licensed software is Adobe Applications (i.e. Illustrator, Photoshop, InDesign, Acrobat Pro, etc.). Due to Adobe's licensing restrictions Harvard is unable to offer the software in a 'network licensed' environment. Instead, you can purchase the Adobe Standard Create Suite at a significant discount (\$199) by visiting www.computers.harvard.edu with your HUID and pin. Click on "Shop at Harvard" to enter the purchasing portal.

Computer Resources Help Desk

- You are urged to plan a visit to the Computer Resources Help Desk between now and the week of August 13th if you need help or want assistance securing the software requirements for the Digital Skills Class.
- The Help Desk is open from 9am-5pm Monday through Friday in Room 520.

9:00 – 10:00 AM – CRG Troubleshooting, VPN checks, Breakfast

Traditionally, architects developed their work using 2 dimensional drawings, plans, sections and elevations. Those serve key references for the actual building process, and consequently, conventions and notations have developed so that many different people can read the drawings and comprehend the architecture to be built; the drawing is a contract, a text and a description. In addition, the artifact of the drawing plays a key discursive role in the field. We will show examples of different kinds of architectural drawing and begin to learn how these may be digitally constructed.

Resources

Introduction to the GSD digital network, means of access, printing, internet access, finding important references.

AutoCAD Skills

- File organization, layer management, interface logic
- Key commands
- Importing, scaling, interpreting raster images for base plan development
- Viewports, measuring and dimensioning

Assignment: Keeping materiality and tectonics in mind, generate a set of properly scaled plans and sections in AutoCAD from the diagrammatic drawings of one of Modern Architecture's prime examples. As is true of all orthographic drawings, each of the documents provided will only supply you with partial information, and you must read the drawings as a set to understand the building as a whole. The goal is to exercise your understanding of organizing principles in architecture and to explore 2-dimensional drawings as a design tool to analyze and generate 3 dimensional space.

Goals: Before the start of day 2, have completed a set of at least 3 scaled AutoCAD drawings: 2 plans, and at least 1 section or elevation.

With the introduction of computation in architecture, the architect was able to develop proposals for the built work through three-dimensional digital models in addition to two-dimensional drawings. A constant feedback loop between 2D drawings and 3D digital models informs the work of today's architects. You will learn in class how to move between 2D and 3D digital representations.

Rhino Skills

- Program overview and NURBS modeling discussion
- Interface logic, file organization, layer management.
- Workflow between AutoCAD and Rhino
- Importing 2D drawings as base for 3D digital model construction
 - Basic 3D modeling in Rhino

Assignment: Using the base drawings you generated in AutoCAD, you will bring them into Rhino to use them as a reference for building a 3D model of this canonical project. The line drawings can be thought of as a skeletal structure for the model – when combined together, 2D drawings begin to take form in 3D space. Digital modeling has the ability to neglect tectonic parameters such as thickness, structure, and hierarchy. We will consider these elements and more to prime you for the design projects you will be doing at the GSD.

Goals: Before the start of day 3, have a completed 3D model of Schroder house.

Digital modeling not only serves for the representation of architectural designs that exist or that had been drawn up in 2 dimensional drawings, but can also become the site for generating architecture, for designing buildings. The logic of the software should be critically assessed as it often literally informs computer generated design.

AutoCAD / Rhino Skills

- Modeling Topography in Rhino
- Advanced modeling—developable v. non developable surfaces
 - Basic discretizing of complex surfaces
 - 3D Modeling for physical model v. 3D modeling for rendering

Assignment: Up until this point, you have fully understood and represented the existing house. You have now been approached by the owners of the house, two artists, to make a 64 sq. ft. addition to the house. The addition is intended as a place for meditation where the artists may go to escape the clutter of their home. The only conditions from the clients are that they may occupy the room and that the room has access to natural light. The clients also ask that the architect be mindful of the existing logic of the house. Applying some of the skills you have developed, you will work in both 2D (CAD) and 3D (Rhino) space to design this addition. Furthermore, the artist couple has also requested that the architect propose the design of an envelope for the house, a type of wrapper where the logic of the house and the addition of the new room be expressed. Continuity between the wrapper and the new addition is key for the artists to see in the proposal.

Goals: Before the start of day 4, have a completed three Rhino models, one with the original Schroder house (day 2), a second model with your intervention two interventions (the wrapper and the new room) and a third model as a massing model of the house as seen with the new wrapper. Because the clients are still undecided about the new “wrapper”, make sure your second model has a clear layer structure where one may see the building with and without the new wrapper by simply turning a “wrapper” layer on and off.

Most of the actual presentation of that which has been generated as a 3D computer model will necessarily be via a 2D format. These drawings may be used on the construction site, or simply be turned into carefully calibrated images of the architecture; they may depict the building as-is or choose to highlight certain aspects that were relevant for the design conception.

Rhinoceros and AutoCAD Skills

- “Make2d” plans, sections, and axonometric drawings
 - Creating and saving views in Rhino
 - Exporting from Rhino to AutoCAD (and Illustrator)
 - Editing drawings in AutoCAD
 - Projecting from Plan to Section in CAD, using construction line techniques
- Plotting from AutoCAD

Illustrator Skills

- Introduction to Illustrator interface layout, layers and graphic techniques
 - Transitioning from Rhino / AutoCAD into Illustrator
 - Preserving Layers, Grouping
 - Editing line-weights in illustrator
 - Plotting to PDF from Illustrator
- Generating process/concept diagrams from Rhino using “Make2d”
- Using Illustrator for graphic effects

- Adding overlays, color, scale figures and underlays

Assignment: Utilizing the Rhino models developed in Day 3, and taking advantage of your new Rhino and Illustrator skills, line-weight and resolve the following drawings:

- Plan or section of the existing building
- Plan or section of the building including your intervention (to be compared with the existing)
- One set of axonometric diagrams that explain the logic of your intervention.
- Optional diagrams which may further sell or explain your design idea

Goals: Before the start of day 5, have completed a set of PDF's with your fully resolved and line-weighted drawings.

Day 5: Exploration through 3-d Representation I / Model making	Friday August 17
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Architecture develops in a constant feedback between 2D and 3D, between material reality and the digital. It is thus of great importance to see how these two realms -- one bound by gravity the other free of it, one with material weight and dimensionality (thickness), the other able to spare both -- inform one and another. A simple exercise will suggest the complexities this process can entail, and how hard it may be to actually construct with real materiality that which was easily resolved in the digital realm.

Rhino to Laser Files

- Unrolling for laser cutting
- AM: Laser file preparation, best practices
 - Layer Management
 - Templates
 - Cut Order by color
 - Cut vs. Etch, Solid vs. Dashed, Vector vs. Raster
 - Planning for Laser Kern and Material Thickness

Materials and Lasercutting

- Material Selection
 - Shop Store
 - Utrecht, Altec, Dickson's, Internet
- Material preparation
 - Cutting to Size
 - Plexi: paper vs. not paper
 - Managing burn marks
- Laser Settings, test techniques
- Labeling Laser files (GH scripts, what font to use, best practices)
- Keeping your pieces organized

PM - Introduction to Laser Cutting Facilities:

MANDATORY Laser Orientation in groups, 2-5 PM with Rachel Vroman (rvroman@gsd.harvard.edu)
YOU only can use the Laser Cutters if you attended the orientation.

Assignment: Develop laser files that will generate a model of your project. The model should clearly express mayor openings in the house and should give the client a good understanding of the two interventions-- the wrapper and the new room. Decide on the material quality of your model and make sure to account for material thickness when developing your laser files.

Goals: Before the start of day 6, have completed a set of laser files ready to be cut. Have purchased all materials needed for your model.

Assembling Laser cut Models

- Modelmaking Techniques
 - Folding
 - Stacking
 - Built Tectonic
 - Sequential Section
 - Material Options for each – show examples
- Assembly techniques – Glue
 - Types of glue appropriate for different materials
 - Gluing technique
- Potential of other digital fabrication techniques
- Other Shop Resources:
 - Milling -- Preparing for routing – Shop Website
 - 3d Printing
 - Fabrication lab website overview
 - ‘water tight’ modeling, material thickness
 - Meshing and *.stl settings for different printers

Assignment: Cut, begin to assemble models

Goals: Before day 7 have all you files laser-cut and ready to be assembled.

AM - Time for assembling Laser pieces / finalization

PM - Presentation and discussion of models

MANDATORY Woodshop Orientation in groups, 2-5 PM

YOU only can use the Woodshop if you attended the orientation.

Assignment: Finish assembling models

Goals: By the end of day 7 have a completed physical representation of your design intention.

Architecture uses material, channels light, creates affect. Different techniques are available that help to explore, develop and render visible the spatial and atmospheric conditions created. In addition to using the computational tools available for the simple or photorealistic representation of architectural design, they may also be used analytically and generatively.

Rhino / V-Ray / Photoshop Skills

- Interior and exterior renderings using V-Ray
- Lighting for V-Ray
- V-Ray render settings
- V-Ray material basics

- Introduction to Photoshop interface, key commands/tools
- Post-production work in Photoshop
 - Adjusting Levels, Saturation
 - Color editing

- Lighting adjustments
- Collage techniques
- Rendering over line diagrams [camera aspect ratios]
 - Make 2D / Render Workflow to Photoshop/Illustrator

Assignment: Generate at least 2 renderings (1 exterior, 1 interior) to present the conceptual intentions of your design. Renderings are an opportunity to explore your vision for the finished space and are a necessarily continuation of the design process. Edit in Photoshop to create a photo-montage/collage that develops your conceptual, atmospheric, and material aspirations.

Goals: Before the start of day 9, have a *.jpg version of your two or more renderings. Collect these jpegs along with clearly labeled files of all previously completed drawings in an easily accessed folder.

Day 9: Concepts and Communication	Thursday August 23
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Finally, the presentation of architecture is crucial. With the presentation, an argument is produced, and the attention of the beholder of architecture can be directed. Both verbal and visual presentations are important components of an architect's daily work.

InDesign / Plotting Skills

- Introduction to InDesign interface layout and key tools
- Setting up boards/layouts in InDesign
- Generating PDFs and optimizing for digital viewing
 - Presentation vs. Portfolio
- Plotting at the GSD – CRG website

Assignment: Using the collected materials developed in day 4 and day 8 (2D drawings and renderings), generate a simple 24"x36" board that represents your concept and thesis. We will end the day/week with an informal pinup to discuss the work and personal strategies towards representation and presentation. Through this short exercise, you will test your facility to convey and discuss your ideas with sophistication, which will prepare you to immediately engage your projects and professors at the start of the semester.

Goals: Gain a basic understanding of what it takes to develop and present a project.