

Department of Architectural Technology

ARCH 1291

VISUAL STUDIES II

1 classroom hour, 2 lab/studio hours, 2 credits

Course Description: Visual Studies II builds on the knowledge of architectural representation and visualization obtained in ARCH 1111 and ARCH 1191. This course is taken in tandem with ARCH 1211 (Architectural Design II: Foundations), and focuses particularly on: precise crafting of physical and analogue models and architectural presentations, analogue and digital rendering techniques, and representation of geospatial information. The course provides the tools for students in their design work by strengthening their skills visually, verbally, and graphically so they may demonstrate their fluency in and understanding of key design vocabulary, concepts, and visual techniques.

Course context: This course is a requirement and serves as the basis for all courses involving presentation and representation including the Design Studio sequence and the Building Technology sequence.

Prerequisites: ARCH 1110: Architectural Design I Foundations I with a grade of C or greater
ARCH 1191: Visual Studies I with a grade of C or greater

Co-requisites: ARCH 1210: Architectural Design II: Foundations

Required Texts:

Lupton, Ellen, *Graphic Design: The New Basics*. 2008, New York: Princeton Architectural Press.
Rhino Level I and II Training Manuals (Free downloadable from:
<http://download.rhino3d.com/Rhino/4.0/Rhino4Training>)

Recommended Texts:

Ching, Frank, *Architectural Graphics*. 2009, Hoboken, NJ: John Wiley & Sons.
Pottman, H. et al. *Architectural Geometry*. 2010, Philadelphia: Bentley Press.
Tufte, Edmund, *Envisioning Information*. 1990, Cheshire, CT: Graphics Press.
Tufte, Edmund, *Beautiful Evidence*. 2006, Cheshire, CT: Graphics Press.
Samara, Timothy, *A Handbook of Basic Design Principles Applied in Contemporary Design*. 2008, Providence: Rockport Publishers.
Zell, Mo, *Architectural Drawing Course: Tools and Techniques for 2D and 3D Representation*, 2008, Boston: Barron's.
McCandles, David, *Visual Miscellaneum*. 2009, New York, NY: Collins Design Publishers.
websites: Visual Economics, Information is Beautiful, Mathematica, and Google Earth/Maps resources

Attendance Policy: No more than 10% absences are permitted during the semester. For the purposes of record, two lateness are considered as one absence. Exceeding this limit will expose the student to failing at the discretion of the instructor.

Course Structure: This course will be offered as a lecture/lab format with hands on tutorials that introduce concepts, techniques and methods needed for completion of the assignments. Students will produce a series of projects through hand tools and techniques and digital means that communicate ideas and incorporate data of increasing complexity in a variety of presentation formats. These assignments will be presented as part of in class presentations or in conjunction with Design Foundation II presentations.

Grading:

In-class Exercises and Homework	75%
Electronic Submittal of all course work	10%
Class Participation	10%
Sketchbook	5%

Academic Integrity: Students and all others who work with information, ideas, texts, images, music, inventions and other intellectual property owe their audience and sources accuracy and honesty in using, crediting and citation of sources. As a community of intellectual and professional workers, the college recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and is punishable by penalties, including failing grades, suspension and expulsion.

Learning Objectives

Upon successful completion of this course, the student will:

1. **Distinguish** between types of drawing techniques and **apply** as appropriate in architectural contexts (Knowledge)
2. **Demonstrate** understanding of computer hardware and software methods and standards as used in architectural practice (Knowledge and Skill)
3. **Demonstrate** knowledge of graphic conventions and methods of digital file organization (Knowledge and Skill)
4. **Communicate** ideas and information through oral presentations. (Gen Ed)
5. **Recognize** and **use** design concepts and vocabulary (Gen Ed and Skill)
6. **Create** digital 3-D models (including BIM) of medium geometric complexity and produce orthographic, axonometric, and perspective views. (Skill)
7. **Create** digital two-dimensional orthographic drawings. (Skill)
8. **Manipulate** vector and raster files. (Skill)
9. **Create** analogue and digital renderings. (Skill)
10. **Perform** form generating parametric modeling. (Skill)

Assessment

To evaluate the students' achievement of the learning objectives, the professor will do the following:

1. **Review** students' selection of drawing techniques. (Lo: 1)
2. **Observe** students' progression from simple to complex thinking as shown in sketches and completed projects. (Los: 1, 4, 7)
3. **Observe** students' use and manipulation of computer hardware and software. (Los: 2, 3, 6, 8)
4. **Inspect** students' digital files for use/application of professional standards. (Lo: 3)
5. **Inspect** students' portfolios for quality of documentation and editing as well as organization. (Los: 3, 6)
6. **Review** student digital files for use/application of professional standards. (Lo: 3)
7. **Review** students' drawing and modeling work where students must exhibit their visual representation skills (2-D and 3-D). (Los: 3, 4, 5, 6, 7, 8, 9, 10, 11)
8. **Assess** the students' use of professional vocabulary during oral presentations. (Los: 4, 5)

Course Outline:

Visual studies is closely correlated with Architectural Design II: Foundations; therefore, the following outline sequences skills to support project development. All digital files should be submitted in native and PDF formats.

1291 WEEK 1: INTRODUCTION & 3D MODELING

Lecture: Introduction to architectural 3D modeling by showing examples of digitally produced work. Examples display various modes of output (screen capture, rendered, photo-realistic rendering, 3D print).

Concepts & Vocabulary: Nurbs, meshes, parametric modeling, vector based drawing, Boolean operations

Assignment: Based on the work for Arch 1210 Exercise 1,- CUBE, SUPER CUBE, & UNCUBE- create digital models of the SUPER CUBE and UNCUBE that explore the same design as for Arch 1210 but achieve it through different means; i.e. carve away at the cube to create the UNCUBE or map a digital image onto the surface. Show a variety of different means by which to achieve the same result. Compare digital results with physical model and hand renderings of isometric. Create 11x17 boards in INDESIGN with title block that show all three cubes and both the analog and digital variations. Print model using screen capture. Edit in Adobe Photoshop.

SKILLS: 3D modeling software (McNeel Rhinoceros), solids Booleans, Adobe InDesign and Photoshop.

1291 WEEK 2: SURFACE CREATION 3D MODELING CONT'D

Lecture: Introduce surfacing editing and analysis tools in pursuit of “water-tight” models. Reinforce best management practices for file names, folder structure, and layer management.

Concepts & Vocabulary: Scale, Size, Form, Shape, Geometric and Spatial Relationships

Digital Skills: Surface Modeling and Transformation, Normals, Edge Editing, Cage Editing, Trim, Slice, Join

Assignment: Using Exercise 2 from Arch 1210, recreate one of the four groupings digitally by creating surfaces and not solids. Compare digital results with physical model and hand renderings of isometric. Create 11x17 boards in INDESIGN with title block that show both the analog and digital variations of the grouping. Print using quick render. Edit in Adobe Photoshop.

SKILLS: 3D modeling software (McNeel Rhinoceros), Surface Modeling and Transformation, Normals, Edge Editing, Cage Editing, Trim, Slice, Adobe InDesign and Photoshop.

1291 WEEK 3: Adobe Photoshop Introduction & Peripherals (intro adobe suite, photography, scanning, rgb, color, calibration of tools, monitor, printer etc.)

Lecture: Introduce digital color calibration. In vector/raster based software (/Photoshop) demonstrate CMYK, RGB, and grayscale color modes and explain the uses of each. Explore color libraries such as Pantone colors. Create a framework to test color combinations. For photography, discuss color temperature value (sun versus fluorescent bulb & Color Rendition Index)

Concepts & Vocabulary: Color (Hue), Saturation, RGB Value Combinations drawing and color related tools

Assignment: Photograph models from Exercise 2 in Arch 1210. Bring photos into Adobe Photoshop: Edit image size (control proportion, and resolution, understand sampling). Edit color curves for images creating a balanced white (not too blue, not too yellow). Change photographs to grayscale, create three tone images (white, gray, and black). Change photographs to black and white; control brightness and contrast). Create 11x17 layout in Adobe InDesign with title block for each iteration showing original image and variations.

SKILLS: Digital Skills: 2D Raster Image Editing Software (Adobe Photoshop),

1291 WEEK 4:

Lecture: COLOR HAS EFFECT: Discuss how to create a 2-D composition and apply primary, complimentary, and analogous colors in order to create a desired affect. Introduce Adobe Illustrator (raster/vector interface).

OBJECTIVE: Students will gain an understanding of primary and complimentary colors as elements. How elements can become pattern.

DESCRIPTION: Color significance, Digitizing patterns, color wheel analysis, pattern coloring

Lab & Homework: **PRESENTATION OF EXERCISE 3
EXERCISE 4**

PROCESS:

1. Choose a color photograph from a magazine; 4" x 6"
2. Scan the photograph.
3. Place Photograph in 11x17 art board-design orientation, layers, etc..
4. Identify at least 10 color basic pattern areas.
5. Draw in Illustrator an equal sized area underneath the photograph.
6. Transfer areas of the 10 color basic pattern areas into this rectangle.
7. Create a grid and match color areas as closely as possible.
8. Using grid, create a pattern using the squares or rectangles.
9. Using the same pattern, reduce the colors to 3 analogous colors.
10. Repeat same pattern, but color with 3 complimentary colors.
11. Repeat same pattern, but color with 2 sets of analogous colors that are compliments.
12. Assess and write the goal and outcome of each study.
13. Create 11x17 plates for each stage of the exercise with outcomes in Adobe InDesign.

Reading: Lupton, Ellen and Jennifer Cole Phillips. Graphic Design: The New Basics, pp. 70-83.

SKILLS: Digital Skills: Adobe Illustrator (Raster, Vector Bridge), digital drawing, layer management, art board set up, etc.,

1291: WEEK 5: Vector Drafting in CAD

Lecture: Introduce 2D-CAD (Autocad) drafting and highlight similarities and differences between hand drafting and digital drafting (line weights, layer management, blocks for page size and titleblock). Highlight differences between page layout in CAD versus InDesign/Illustrator/Photoshop.

Concepts & Vocabulary: Line weight, Layers, pens, blocks, Mtext, drafting tools (line, polyline, circle, copy, etc.)

Assignment: Option 1: Draft any of the previous hand drafted exercises from 1210 (Exercise 1, or Exercise 3, include at least one drawing that was not previous hand-drafted.

Option 2: if sequencing allows draft plans and elevations of chosen architect's house for Arch 1210 Exercise 5: Paleontology: The Big Picture). (Total drawings should include: plan, elevations, sections, plan and or elevation oblique and/or isometric).

SKILLS: CAD 2D drafting and Layout, Layer management, Line weights, paper space, model space, etc.

1291 WEEK 6

Lecture: **ARCHITECTURAL PALEONTOLOGY, A CLOSER LOOK:** Discuss how research is the basis for design continued.

OBJECTIVE: Students will learn how to use various sources: books, online websites, images, to create a set of plans, elevations, and sections.

Research: Select a house to document, analyze, and build from the following list. Your research will include thematically associated artists, as well as furniture and designed objects from the

same era. These forces will help to shape your point of departure for choosing an appropriate manner in which to render the final model and its context:

1291 WEEK 7

Working with the 2D drafted drawings and /or model from the previous exercises, set-up a file to be sent to the laser cutter. A presentation on fabrication and digital fabrication should be given to demonstrate how automated manufacturing is changing design. At least one portion of the student's project for ARCH 1210 should utilize the laser cutter for fabrication.

Concepts & Vocabulary: Additive vs. subtraction fabrication; surface vs. contour modeling with subtractive processes

Digital Skills: Drawing adjustments for model building; Unroll Surface Commands; Laser Cutter Operation

Assignment: Physical model fabrication

SKILLS: How to create a file specifically for production: 2D Laser cutter; line weights become power strengths, etc. Relationship between orthographic views and three dimensional model, sustainable material usage, proper materials for laser cutter (no foam core) etc.

WEEK 8: MORE DRAFTING

Continue to refine drawings from previous exercise. Introduce conventions for exporting and importing CAD between various software. Import 2D drawings into a 3D modeling software and extrude a basic massing model. Additional architectural detail will be added as appropriate.

Concepts & Vocabulary: Massing vs. presentation models.

Digital Skills: Review 2D software concepts from Week 8. Reinforce extrusion tools; introduce window, door, and mullion creation, as well as file export/import between software used. Creation of topographic site models. Introduction to photorealistic rendering (V-Ray)

Assignment: Extrusion/ lofting for watertight models, and rendering exercise (material importing)

1291 WEEK 9: PHOTOREALISTIC RENDERING (V-Ray)

Working with the 3D model from the previous exercise, map a selection of materials to the surfaces. Add lights and cameras. Utilize a photorealistic rendering engine (V-Ray) to build upon rendering previously learned rendering skills.

Concepts & Vocabulary: Transparency/Opacity, Mapping Types

Assignment: Paleontology model rendering

SKILLS: Digital Skills: Mapping; V-Ray Lighting and Material Setup; Manipulating Existing Materials; Mapping

1291 WEEK 10: MULTI-PAGE LAYOUT (portfolio)

Demonstrate multi-page layout software (InDesign) and present examples of printed, projected, and bound documents. Discuss page layout and composition for various types of output. Show examples of graphic communication techniques including information visualization, and architecture specific examples of presentation boards, magazines, books, and lecture series posters. Create master pages, and set-up styles for document consistency.

Design Concepts & Vocabulary: Hierarchy, Alignment, Balance in Page Composition; Master Pages; Text Design Integration, Kerning, and Justification

Digital Skills: Text Tools, Master Pages

Assignment: Presentation layouts

1291: WEEK 11 & 12:

Lecture: **ADDITIVE AND SUBTRACTIVE:** Discuss additive and subtractive methods of creating form.

OBJECTIVE: The goal of this project is to expose students to two techniques for defining volumes and space. The first technique is additively assembling cut sheet material. The second is the subtractive process of removing material from a solid. Students will also learn how to manipulate contours and how the site plays an integral role in the design of place.

DESCRIPTION: This project will challenge students to create relationships between objects of various sizes and materials in a landscape. A total of 5 cubes will be conceptualized, designed, and crafted using both additive and subtractive modeling techniques. In order to develop a conceptual catalyst for the cubes, students will use language to define complimentary and/or contradictory sets. The topographic site will then be modified/designed in order to enhance relationships between the various cubes, and to further reinforce overall ideas.

Lab & Homework: **EXERCISE 10**

Construct a series of cubes using both additive and subtractive methods and thoughtfully place them in a landscape. The design of each cube should be intentional and contribute to an overall narrative.

1. Working with chip board or card board, create one 3" and one 1 ¾" cube study model. One of the cubes should be "in-the-manner" of your architect from the previous exercise. The other cube should be defined by you.
2. Working with blue foam or Styrofoam, create the inverse of your 3" and 1 ¾" study models.
3. Working with chip board/cardboard and blue foam/Styrofoam create a 3" and 1 ¾" hybrid study model.
4. You will be given a 9" square contoured site. Roughly cut the contours out of cardboard. Site five (5) of your study models. Modify the contours to enhance the design.
5. Draft your modified contours in a vector drafting software (Rhino) and laser cut. Remake your 5 models out of bass wood and plaster of Paris. You may laser cut your bass wood as appropriate. Attach securely to your site.
6. Using a photograph of your model as an underlay, sketch two perspective views. Add entourage, shade, and color.
7. Scan your sketch and format an 11"x17" presentation board in page layout software (Adobe InDesign).

Reading: Hannah, Gail Greet. Elements of Design: Rowena Reed Kostellow and the Structure of Visual Relationships, pp.96-117.

1291: WEEK 13:

Lecture: **FORM AND LIGHT:** Discuss how architects use light to shape their designs.

Objective:

Description:

Lab & Homework: **EXERCISE 10**

Design and build a working lamp based on additive and subtractive formal studies.

1. Choose two of your cubes from the previous exercise as a reference point. Sketch with charcoal the way that light interacts with these objects. Refine your sketches to define a clear light effect.

2. Create a study model out of chip board/cardboard and tracing paper to simulate with 3-D materials your light effect.
3. Refine your design through models and sketches.
4. Your final lamp must consist of a subtractive component made of wood or plaster, and an additive component made of an opaque sheet material of your choice, and a translucent/transparent sheet material of your choice.
5. The final lamp must have an integral light source and power supply.
6. Prepare 11"x17" presentation plates with your original charcoal sketches, photos of the process, multi-view drawings, and a final illustration of the design. Present your lamp and presentation plates to a jury.

PRESENTATION OF EXERCISE 11

WEEK 14: 4D REPRESENTATION

Desk crits for final presentation layouts. Introduce simple movie-making techniques (MovieMaker) and concepts including sequencing, narrative, and composition. Create a short movie clip of a light effect coordinated with the ARCH 1210 lamp design project. Post-process the movie to add a title and sound.

Concepts & Vocabulary: Story Boards, Frame Composition

Digital Skills: Introduction to Creating Narrative and Editing Film Sequence; Addition of Text and Sound Elements

Assignment: Making movies/layout finalization

1291: WEEK 15:

Lecture: **FINAL PRESENTATION:** Final pin-up and presentation of Exercise 10 and all weekly sketches. Verbal presentations by students with a review jury of at least one outside critic. Written feedback on student performance completed and distributed.

SKILLS: Presentation: PowerPoint Portfolio presentation pre-requisite for 2310 and co-requisite for 1210. Formatting Presentations, Oral Presentation, Written Reflective Piece.

Optional Exercise for Week 15 if time allows: 1291 WEEK 13: PARAMETRIC MODELING

Introduce the concept of relationship-based parametric modeling and compare and contrast the logic with traditional analog modeling, and explicit 3D digital modeling. Geometry is essential for parametric modeling, so review basic shapes and how they are defined. Create a simple module with a precise underlying geometry. Deploy this model over a surface to create a tiled effect. The resulting pattern should inform design decisions for the lamp design project in ARCH 1210.

Concepts & Vocabulary: Rule Based Design; Vectors, Sets & Lists, Parameters, Sine Curves, Delauney and Voronoi Patterns

Digital Skills: Program Interface (Grasshopper), Setting up Lists,

Assignment: Tiling