

Architectural Visualization  
Using AutoCAD 2010, Revit  
Architecture 2010 and 3ds-  
Max Design 2010

Fall 2009

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**Sessions 1 and 2 - Within these first two sessions the class will be introduced. Students will go through preparing the file that will be brought into 3ds Max from both an AutoCAD perspective as well as a Revit perspective. Next, we'll begin to explore the 3ds Max 2010 interface including the application menu, pull-down menus, toolbars, the Command Panel and the Ribbon.**

- A) Getting Started
  - 1) Why work this way?
  - 2) Benefits
- B) AutoCAD
  - 1) Open the Floor Plan
  - 2) Organization
    - a) Layers
    - b) Cleaning up your file
      - i) Purge
      - ii) Audit
    - c) File and Folder Creating and Naming
- C) Revit
  - 1) Import the AutoCAD File
  - 2) Build the Walls
  - 3) Build the Door
  - 4) Build the Floors
  - 5) Build the Windows
  - 6) Build the Columns
  - 7) Export to FBX
- D) 3DS MAX
  - 1) User Interface
    - a) 3ds Max Application Menu
      - i) Left Column
        - \* Import
        - \* Export
        - \* References
        - \* Manage
        - \* Properties
      - ii) Recent Documents
      - iii) Options
      - iv) Quick Menu
    - b) Pull-down Menus
      - i) Selected Pull-down Menu Items
        - \* Edit --> Hold/Fetch
        - \* Customize --> Set Units
          - System Units Setup
    - c) Toolbars
      - i) Quick Access Toolbar
      - ii) Main
        - \* Undo/Redo History (right-click)
      - iii) Axis Constraints
      - iv) Layers
      - v) Snaps

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- d) Command Panel
  - i) Create
  - ii) Modify
  - iii) Hierarchy (for Pivot Points)
  - iv) Motion (for Time, Date and Location of Daylight Systems)
  - v) Display
  - vi) Utilities
- e) The Ribbon
  - i) Functionality
    - \* Minimizing
    - \* When They're Available
  - ii) Graphite Modeling Tools
  - iii) Freeform
  - iv) Selection

**Session 3** - In this session, we'll complete any topics we couldn't get to in previous sessions. Additionally, we'll go through how to navigate the 3D space of 3ds Max and how to select objects.

A) 3DS MAX

2) Viewing

- a) Viewports and How to Switch Between Them
  - i) Making Current
  - ii) Resizing (and resetting)
  - iii) Maximizing (ALT+W)
  - iv) Viewport Controls
    - \* Viewport Configuration - "+"
      - Lighting and Shadows Tab
      - Viewport Lighting Options Group
      - Global Settings Group
    - \* View Changing
    - \* Viewport Appearance
- b) Navigating within an Orthographic Viewport
  - i) Pan
  - ii) Zoom (also, ALT+MMB Scroll)
  - iii) Other Orthographic View Navigation Icons
- c) Navigating within a 3D Viewport
- d) Object Display
  - i) Display Tab
  - ii) Isolation Mode

3) Selecting Objects

- i) Clicking to select
- ii) Scene Explorers
  - \* Naming
  - \* Adjusting Settings
  - \* Filtered Display
  - \* Columns

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- \* Sync Selection
- \* Right-clicking and Using a *Scene Explorer* to  
Adjust Object Display Options
- iii) Selection regions
- iv) Window/crossing
- v) Filters
- vi) Lock selections
- vii) Select Similar
- B) Homework - Explore the various methods of moving within 3D space in 3ds  
Max 2010

**Sessions 4 and 5** - In these sessions, we'll complete any topics we couldn't get to in previous sessions. After that we'll clean up both a plan and elevation in AutoCAD in preparation to import it into 3ds Max. Next, we'll go over 3ds Max's *transformations* which include *move*, *rotate* and *scale*. We'll then go through how to import AutoCAD-based plan and elevation drawings into 3ds Max. We'll talk about several organizational utilities after which we'll rotate the imported elevation and align it with the plan. To accomplish this process, we'll discuss object snaps mainly used during moving and rotating. Finally, to prepare you to submit weekly renderings, we'll go over some basic rendering procedures.

A) AutoCAD

1) Clean-Up a Plan

- a) Open plan
- b) Copy/paste plan into new file
- c) Purge and Audit

2) Clean-Up an Elevation

- a) Open elevation
- b) Copy/paste into new file
- c) Purge and Audit

B) 3DS MAX

1) (Select and) Transform

- a) Move
  - i) Axis Constrains
  - ii) Transform Type-Ins
- b) Rotate
  - i) Axis Constrains
  - ii) Transform Type-Ins
- c) Scale

- i) Axis Constrains
- ii) Transform Type-Ins

2) Import AutoCAD Footprint into 3ds Max

- a) Geometry Tab
  - i) *Derive AutoCAD Primitives By*
  - ii) *Geometry Options*
    - \* mapping
    - \* Sun and Sky
- b) Layers Tab

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- 3) Import AutoCAD Elevation into 3ds Max
  - a) Geometry Tab
  - b) Layers Tab
- 4) Organization Utilities
  - a) "Group" pull-down menu
  - b) Layer Manager
- 5) Rotate and Position the Elevation
  - a) Snaps
    - i) for rotating
    - ii) for moving
      - \* 2D
      - \* 2.5D
      - \* 3D
    - iii) Temporary Snapping Override
- 6) Quick Rendering Basics for Weekly Submittals
- C) Homework - Create various 2D shapes on multiple layers, import them into 3ds Max and connect them via their endpoints. Email me the .MAX file at [scott@caduzer.com](mailto:scott@caduzer.com).

**Sessions 6 and 7 - In these sessions, we'll complete any topics we couldn't get to in previous sessions. Next, we'll first go through the process of bringing Revit files with the FBX file format as well as how to use a *work-around* to link the two programs together. After that, we'll go over various creation utilities including the reference coordinate systems, which make it easier to create objects in 3D space, grids, pivot points, the *align* tool and how to determine the distances between points. Finally, we'll go over some basic rendering techniques so you can begin submitting rendered images for your homework.**

#### A) 3DS MAX

- 1) More Rendering Basics
  - a) Show Safe Frame
  - b) Rendered Frame Window
    - i) Area to Render
    - ii) Save
    - iii) Copy Image (to Clipboard)
    - iv) Clone
    - v) Clear
  - c) Render Setup Dialog - Common Tab
    - i) Assign Renderer
      - \* Mental Ray Renderer
      - \* Scanline Renderer
    - ii) Time Output
    - iii) Output Size
  - d) Print Size Assistant
  - e) Render Setup Dialog - Common Tab (continued)
    - v) Render Output
    - vi) Viewport Locking for Renders
  - f) RAM Player

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- 2) Import FBX from Revit Using "FBX Link Workaround"
  - a) FBX Link Work-Around Map
  - b) Import FBX
  - c) Object Organization
  - d) Save with "-model" suffix
  - e) X-Ref Scene Tool vs. X-Ref Object Tool
    - i) XRef "-model" object into "-materials" file and save
    - ii) Change an Objects' Material in 3DS MAX
    - iii) Return to Revit and Make a Design Change
    - iv) Re-Export FBX (save over old version)
    - v) Erase all objects in model file and import new FBX
    - vi) Save and close model file and open Material file to see updates

### 3) Creation Utilities

#### a) Reference Coordinate Systems

- i) View
- ii) Screen
- iii) World
- iv) Local
- v) Pick

#### b) Grids

- i) The Home Grid and its Options
- ii) User Grids and their Options
- iii) AutoGrids
- iv) Grid Reference Coordinate System

#### c) Pivot Points

- i) Regular - Adjusting and Resetting
- ii) Working - Heirarchy Tab ("Edit Working Pivot" button)
- iii) Working Reference Coordinate System and the "Use Working Pivot" Button
- iv) "Use Center" Options

#### d) "Align" Tool

- e) Determining Distances using the Tape (measure) Object

B) Homework - Create several boxes on both the ground plane as well as on the sides of other boxes. Experiment with the align tool and render out a single JPEG image. Email it to me at [scott@caduzer.com](mailto:scott@caduzer.com).

**Sessions 8-9 - In this sessions, we'll complete any topics we couldn't get to in previous sessions.**

### A) 3DS MAX

#### 1) Creating Objects with built-in MAX tools ("Create" tab)

- a) Geometry Icon (and the "Modify" tab)
  - i. Common Parameters
  - ii. Standard Primitives
  - iii. Extended Primitives
  - iv. Built-in Architectural Objects
- b) Cloning

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- c) Array
- d) Mirror
- B) 3DS MAX
  - 1) Creating Objects with built-in MAX tools ("Create" tab)
    - a) Shapes Icon
      - i. Common Parameters
      - ii. Splines
        - \* Line
        - \* Using a "rectangle" as a measuring tool
      - iii. Extended Splines
    - b) Spacing Tool
- C) AutoCAD and 3DS MAX
  - 1) Creating Objects from 2D AutoCAD shapes
    - a) Modifiers and the Modifier Stack
      - i. Lathe (same as revolve) Modifier
    - b) Lofting
      - i. Ex. A curved roof
  - 2) Editable Spline (the difference between using "convert to" and adding an, "Edit Spline" modifier)
    - a) Sub-Objects
      - i) Selection
        - \* Vertex
        - \* Segment
        - \* Spline
      - ii) Attaching Multiple Splines Together
        - \* Weld
      - iii) Trim/Extend Modifier
      - iv) Common
      - v) Sub-Object Selection Sets
  - 3) Creating Lofted Objects from 3DS MAX shapes
    - a) Ex. A sidewalk
  - 4) Extrude an Elevation with the Extrude Modifier - Editable Spline  
Continued
- D) Summary

### **Session 10** - Graphite Modeling Tools

- A) 3DS MAX
  - 1) Creating the floor in 3DS MAX (vs Revit)
  - 2) Convert to Editable Poly vs. adding an, "Edit Poly" modifier
    - a) Sub-Objects
      - i) Graphite Modeling Tools Tab - Selecting
        - \* First Group
          - Vertex
          - Edge
          - Polygon
          - Element
          - Border
        - \* Modify Selection Group

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- Loop
- Ring
- Grow
- Shrink
- Ring Mode
- Loop Mode

ii) Selection Tab

- \* Select Group
- Tops
- Open

b) Box Modeling a Cabinet

i) Polygon, Edge and Borders (Hold down "Shift" for settings)

- \* Extrude
- \* Outline
- \* Bevel
- \* Inset
- \* Flip
- \* Create
- \* Insert Vertex
- \* Chamfer
- \* Bridge ("Polygons" and "Edges" groups)
- \* Create Shape from Selection
- \* Swift Edge Loop ("Edit" group)
- \* Remove ("Loops" group)
- \* Paint Connect ("Edit" group), Connect ("Loops" group)
- \* Polygons ("Loops" group)

ii) Element

c) Modeling from Sketches

3) Bringing Multiple Files Together ("File," pull-down menu)

- a) Xref Object
- b) Xref Scene
- c) Merge
- d) Containers

B) Summary

**Session 11**

A) 3DS MAX

1) Modifiers (continued)

a) Object Space Modifiers

- i) Concept using the *Bend* modifier
- ii) Bevel
- iii) Cap Holes
- iv) Free Form Deformation (FFD)
- v) Subdivide
- vi) Tessellate

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- vii) Noise
- viii) TurboSmooth
- ix) Slice
- vx) Shell

2) Compound Objects

- a) Terrain
- b) ShapeMerge
- c) Boolean and ProBoolean

B) 3DS MAX

1) Cameras

- a) Types
- b) Parameters
- c) Positioning
- d) Clipping Planes
- e) Camera Correction Modifier

4) Locking a Camera

5) Creating Backgrounds

C) Summary

**Sessions 12 & 13**

A) 3DS MAX

1) Working with Materials

a) Material Editor

- i) Options
- ii) Double-click to magnify
- iii) *Utilities* pull-down menu
- iv) Icons

- \* Get Material
- \* Assign Material to Selection
  - Dragging and Dropping a Material
- \* Reset Map/Material to Default Settings
- \* Show Standard Map in Viewport
- \* Show End Result
- \* Go to Parent
- \* Go Forward to Sibling
- \* Sample Type
- \* Backlight
- \* Background
- \* Select By Material
- \* Material/Map Navigator
- \* Pick Material from Object

e) Maps

- i) Car Paint Shader
- ii) Checker
- iii) Color Correction
- iv) Gradient Ramp
- v) Mix
- vi) Noise

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- vii) Smoke
- f) Multi-Sub Object Materials
- g) Mapping - UVW Map Modifier
  - i) Bitmap Map
  - ii) Tiles Map
- 2) Mental Ray Materials
  - a) Architecture and Design
    - i) Tool Tips
    - ii) Templates
    - iii) Reflections, Refractions and Transparency
    - iii) Self-illumination
    - iv) Special Effects
      - \* Ambient Occlusion
      - \* Rounded Corners
  - 3) ProMaterials in 3DS MAX and Revit
  - 4) Material Explorer
- B) Summary

### **Sessions 14 & 15**

- A) 3DS MAX - Lighting
  - 1) Daylight System
    - i) Creating
    - ii) Daylight Parameters
      - \* Sunlight and its parameters
      - \* Positioning
      - \* Skylight (Mental Ray Physical Sky) and its parameters
    - iii) Exposure Control (Environment and Effects)
      - \* mr Photographic
        - Presets
        - Render Preview
        - exposure setting to adjust aperture and shutter speed
        - Image Controls (highlights, midtones, and shadows)
    - iv) mr Sky Portal
      - \* Intensity Adjustments
- B) 3DS MAX - Mental Ray Rendering
  - 1) *Indirect Illumination* tab
    - a. Final Gather for *Exterior* Scenes (Using Presets and Diffuse Bounces)
    - b. Final Gather and Global Illumination for Interior Scenes
  - 2) Renderer Tab
  - 3) Rendering Presets
  - 4) Global Quality Control Knobs
  - 5) Advanced Rendering Features
    - a) Batch Render

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- b) Scene States
- c) Render Farm
- C) 3DS MAX - Lighting Continued
  - 1) Photometric Lights and Light Distribution Methods
    - a) Target or Free Lights
      - i) Templates
      - ii) Shadows
      - iii) Light Distribution
      - iv) Intensity/Color/Attenuation
      - v) Shape/Area Shadows
    - 2) Self-Illumination (Glow) for Arch& Design Materials
    - 3) Light Lister
    - 4) Lighting - grouping rooms of lights by layer and using the "Render" setting in the Layer Manager to turn them on an off in the viewport (including Daylight Systems)
  - D) 3DS MAX - Review Technology - Turning on Mental Ray Features in the Viewport
  - E) Summary