3Ds MAX 2013 Comprehensive Training for Architects

MCUBE
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ARCHITECTURAL PLANET

For Architects by Architects

OVERVIEW

This course covers Autodesk 3DS Max from the ground up, providing a thorough training of this advanced 3D graphics and modeling package. Covering the interface and walks through common tasks such as modeling, texturing, lighting, and rendering. The course is centered around real-world projects that provide designers practical tips and tricks on using the basic architecture modeling tools to create architectural elements. Learn time-saving techniques and tested production-ready tips for maximum speed and efficiency in creating professional-level architectural visualizations in 3ds Max.

The Course Covers the Following:
- Overall modeling, materials and lighting techniques
- Modeling Architectural elements including tips and tricks for speed and efficiency in architectural modeling.
- A thorough training for the V-Ray render engine, and performing a render post-production enhancement using Photoshop.
- Modeling and rendering an exterior and interior scene as student project.

COURSE STRUCTURE

SECTION 01: Software Anatomy

1. Some Higher-Level Concepts
- Understanding the **3D world** and **Computer Graphics**
  [3D history, 3D software's, calculations]
- **Vector** vs. **Raster** graphics concept
  [Pros and cons, conversion]
- **Color System** and color depth
  [munsell colors, 24 bit colors, monitor]
- **Computer Hardware** in conjunction with 3Ds MAX
  [cpu, vga, ram, hdd, fps, traffic jam]

2. Getting Started With the Interface
- Getting familiar with the **Interface**
  [Caption bar, menu bar, tool bar, app menu, layout bar, command panel, sub-panels, time line]
- Using the 3Ds MAX demonstrative **Help**
  [Search AutoCAD, tutorial]
- Customizing your workspace **CUI**
  [Keyboard shortcut, tool bar]
- Setting user **Interface Defaults**
  [max.vray, light or dark scheme]
- Setting your **Preferences**
  [Undo levels, autoback]
- Understanding **Units** setup
  [System units, display units]

3. Working with Files
- **Saving**, saving as saving selected object(s) and saving incremented files
- **Exporting** to other 3D application formats
- **Importing**, **Merging** and **Linking** models
- **Holding** and **Fetching** a scene
- Viewing scene **Summary info**
- **External referencing** an object(s) or a scene

4. Controlling Viewports
- Viewport **Navigation** and **Configuration**
  [Navigation tools, maximize viewport toggle Alt+w, layout bar, viewport shortcuts T, F, P, L]
- Using mouse buttons to navigate
  [Alt + middle mouse button, pan middle mouse button, activate viewport]
- Adjusting viewports **Layout**
- Using viewport **Clipping**
- Choosing **Shading** modes *[F3, F4]*
- Using the **Viewcube**

SECTION 02: Objects Handling

5. Display in Viewport
- Creating **Standard Primitive** objects
  [Create panel, geometry sub-panel, keyboard entry]
- **Hiding**, unhiding, **Freezing**, unfreezing objects
- **See through** object property *[Alt+X]*
- **Isolating** an object(s) selection *[Alt+Q]*
- **Hiding** by object **Category** *[display panel]*
- **Object Properties**
  [Display as box, backface cull, show frozen in gray, visibility, renderable]
- **Layer Manager**

IN-CLASS PRACTICE 01: [Creating One of the Standard Primitives and Manipulating It's Parameters]

HOME WORK 01: [Creating Each One of the Standard Primitives]

6. Performing Smart Selections
- Selecting by **Click** and **Crossing/Window**
- Different **Selection Windows**
  [Circular, fence, lasso, paint,Q]
- Selecting by **Material** and **Name** *[H]*
- **Inverting** current selection *[Ctrl+I]*
- Selecting **Similar** objects using shortcut *[Ctrl+Q]*
- Using **Viewports** for objects **Selection**
- Selection **Filter**
- Selection **Set**
- **Vol**. **Select** modifier
- **Selection Lock** using *[space bar]*
- Hiding selection **Brackets** *[J]*

7. Working with Objects
- Changing object **Name** and **Color** [random colors]

- Reading the **Transform Gizmo**
  [left hand rule, RGB for XYZ]
- **Moving** objects [W]
- **Rotating** objects [E]
- **Scaling** objects [R]
- Understanding **Coordinate** systems
  [type-in, absolute vs. offset]
- Adjusting an object **Pivot** point
- Accessing the three methods of "**Use Center Flyout**"
- **Cloning** objects with different connections
  [instances, reference, copy]
- **Group** menu commands: Group, ungroup, attach, detach and explode
- **Mirroring** objects or cloned objects

IN-CLASS PRACTICE 02: [Full Furnishing of a Bedroom Interior] *images and max file of the room is provide in class*

HOME WORK 02: [Furnishing an Entire Office Floor of Administrative Building] *images and max file of the floor is provide in class*

8. Objects Distribution
- Using the **Align** tool
- **Normal Aligning** objects face-to-face
- Understanding the **Spacing Tool** for mass distributions
  [shift+I]
- Using the **Array** tool
- Using the **Paint Tool** for blocks distribution
- Snapping types and settings
  [S for snap, A for angle snap]

SECTION 03: Modeling In Depth
9. Modeling Basics
- Surveying different **Modeling Methods**
- Understanding the **Level of Detail**
- The concept of **Sub-Object** levels
  [1, 2, 3, 4, 5, vertex, edge, border, polygon, element]

10. Modeling with Architectural Primitives
- Creating **Extended Primitive** objects
- Creating architectural objects pt. 1: **Walls**
- Creating architectural objects pt. 2: **Doors**
- Creating architectural objects pt. 3: **Windows**
- Creating architectural objects pt. 4: **Stairs**
- Creating architectural objects pt. 5: **Railings**

IN-CLASS PRACTICE 03: [Creating Each Element of the Demonstrated Primitives]

HOME WORK 03: [Modeling a Modern Interior with Elegant Stairs] *images of the interior is provide in class*

11. Modeling with Splines
- Creating shapes *[starting new shape, auto grid]*
- Creating lines
- Using different **Vertex Types**
- Introducing the **Extrusion** modifier
- The concept of **Nested** shapes

- Generating shapes based on a **Cross-Sectional** slice through mesh objects
- Working with **Editable Spline**

IN-CLASS PRACTICE 04: [Drawing a Cross-Section of Drinking Glass]

12. Working with Compound Objects
- Performing **Boolean** and **Pro-Boolean** operations
- Tackling common **Boolean Problems**
- Projecting the vertices of one object onto another by the **Conform** tool
- Embedding a shape in a mesh using the **ShapeMerge** compound object
- **Lofting** shapes along path
  [Adding multiple shapes, moving rotating scaling and cloning shapes after lofting, make vertex first]

IN-CLASS PRACTICE 05: [Using Each Tool to Simulate the Demonstrated Example] *max file of the conform tool is provide in class*

13. Modeling with Modifiers
- Working with the **Modifier Stack**
  [Show end result, modifiers arrangement, pin, remove, on/off modifier]
- Manipulating the **Bend** modifier parameters
  [Limit effect, angle, direction]
- Twisting objects using the **Twist** modifier
- Creating a tapered contour by scaling both ends of an object's geometry by the **Taper** modifier
- Simulating the traditional effect of "Squash-and Stretch" using the **Stretch** modifier
- Creating a 3D object by rotating a shape about an axis using **Lathe** modifier *[lathing a classic roman column]*
- Converting the edges of an object into cylindrical struts with **Lattice**
- Applying random variations in an object's shape with **Noise** modifier
- Using **Push** modifier to add inflation effect to a mass
- Producing a uniform offset in an object's geometry by the **Skew** modifier
- Giving a thickness to an object by **Shell** modifier
- Distorting an object into a spherical shape using **Spherify** modifier
- Building a faces in the holes in a mesh object by **CapHoles** modifier
- Exploring the **Relax** modifier effect on an object
- Slicing through a mesh using the **Slice** modifier
- Adding a wave effect in an object's geometry by the **Wave** modifier
- Adding a concentric rippling effect using the **Ripple** modifier
- Using the **Sweep** modifier to extrude a cross-section along an underlying spline
- Deforming an object using a spline as a path using the **PathDeform** modifier
- Modeling with the **FFD** Modifier
- Using the **Symmetry** modifier

- Reducing the number of faces in an object while preserving the object's appearance by **ProOptimizer**
- Subdividing faces in the current selection by **Tessellate** modifier
- Smoothing geometry in your scene by **TurboSmooth** modifier
- Applying **Modifiers** at the **Sub-Object** level
- Saving your machine effort by **Collapsing** the modifier stack
- **Copying** and **Pasting** modifiers from object to another

IN-CLASS PRACTICE 06: [Modeling the Famous CCTV Headquarter China Building] *images of the building is provided in class*

HOME WORK 04: [Modeling the Riyadh Dancing Towers, Dubai Revolving Towers] *images of the buildings is provided in class*

14. Graphite Polygon Modeling
- Creating a **Box** and converting it to an **Editable Poly**
- Sub-object level **Rollouts**
- Further **Selection** in **Sub-Object** level
- Understanding **Soft-Selection**
- Understanding surface **Normals**
- Controlling detail with **Remove and Cut**
- **Attaching** polygon meshes to a single object
- **Detaching** polygon mesh to a separate object
- **Bridging** parts of a mesh
- **Smoothing** and hardening edges
- Using the **Caddy** to extrude
- **Beveling** a single or multiple polygons
- **Offsetting** a polygon edges using the outline tool
- **Insetting** a polygon
- **Flipping** a polygon normals
- **Tessellating** a polygon into multiple polygons
- **Collapsing** a sub-object into a point
- **Chamfering** or filleting an edge
- **Connecting** two edges with multiple edges
- **Quick Slice** meshes to add more edges
- Using **Paint Deformations** tool to mimic land topography
- Using the **Graphite** ribbon interface
- **Generate Topology** tool for edges
- Inserting edge loops with **SwiftLoop**
- **Random Selection** tool in practical example
- **Dot Loop** selection tool

IN-CLASS PRACTICE 07: [Modeling the France Defense Building] *images of the building is provided in class*

15. Utilities and Helpers
- Creating a user grid
- **Measure** utility for single objects
- Reset **X-Form**
- Measuring with the **Tape Helper**

16. Modeling Architectural Elements
- Modeling with **AutoCAD** drawing workflow
- Modeling a plaza **Landscape**

- Real world car **Parking Details**
  [sweep, enable in viewport and renderer]
- Modeling a simple building **Entrance Stairs**
- Modeling a glazed façade **Curtain Wall**
  [Plane, line extrude, connect, create shape from selection, sweep, enable in viewport and renderer, slice, quick slice, shell]
- Modeling **Floor Tiles** with real reveals
  [Inset, extrude]
- Modeling a **Swimming Pool**
- Modeling a **Building Roof** in few seconds
- Modern entrance **Space Truss** shade
- Façade **Grooves**
- **Signage** with 3D text
- **Spiral** car **Ramp**

HOME WORK 05: [Modeling an Entire Scene of a Residential Villa Including Exterior, Interior and Landscape] *images of the building is provided in class*

17. Filing the Scene with Models
- Using the models **Library**
- Installing the **Copy and Paste** script
- Dealing with **Scene Entourage**

SECTION 04: Organic Modeling
18. NURMS Modeling
- Enabling **NURMS** and understanding subdivision surfaces
- Setting the **Number of Iterations** used to smooth the poly object
- Determining how **Sharp a Corner** must be using the Smoothness value
- **On/Off the Wireframe**, that shows the editable poly object before modification by the Show Cage button
- Using **Isoline** to show the object's original edges before smoothing

19. Subdivision Surface Modeling
- Creating a **Box** and converting it to an **Editable Poly**
- Working with **TurboSmooth**
- **Shaping** the model

20. NURBS Modeling
- **Understanding NURBS**
- Creating **NURBS curves**
- Creating arcs and lines
  [weld, converting all points to Bézier]
- **Converting** Bézier splines to a NURBS object
- **Cloning** sub-objects
- Creating an **Offset Curve**
- Creating a **U Loft Surface**
- **Editing a Dependent Surface** using curves
- Creating an **Extrude Surface**
- Setting surface **Approximation**

SECTION 05: Materials and Textures
21. Getting Ready with V-Ray
- Introduction to **Rendering Engines** and **V-Ray**
  [Other rendering engines, why V-Ray]

- o **Installing** the V-Ray render engine
- o Setting up V-Ray as the **Renderer**
- o **Locating V-Ray's Tools** and features

22. Materials Basics
- o Opening the **Material Editor**
- o Exploring the **Compact Material Editor**
- o Working with the **Sample Slots** and **Scene Materials**
  [Getting material from library, replacing material, putting material to scene, active slot, connected slot, resetting all the slots]
- o **Propagate Materials to Instances**
- o **Resetting** all the material editor slots

23. The V-Ray Materials
- o **Introduction** to V-Ray-specific materials
- o Creating a **Diffuse** color or map
- o Controlling the **Reflective** properties of a material
  [reflection intensity, map, glossiness, Fresnel reflections, max depth]
- o Controlling the **Refractive** properties of a material
  [faces normals, fog color]
- o Explaining the different shaders in **BRDF** rollout
- o Understanding the **Translucency** effect
- o Controlling the different types of **Maps**
- o Exploring the **Slate Material Editor**
- o Explaining the **VRayBlendMtl**
- o Explaining the **VRay2SidedMtl**

24. Mapping Textures in Depth
- o Adding a **Map** to the diffuse channel
- o Getting maps form **cgtextures.com**
- o Using **UVW Map Modifier** to properly wrap maps on an object
- o Understanding the **Real-World** scale
- o Modifying the scale of a map applied to an object by **MapScaler** modifier
- o Show **Shaded or Realistic Materials With Maps** in viewport globally

25. Working with Procedural Maps
- o The **Concept** of procedural maps
- o Modifying a map color and brightness with-in 3ds max interface using the **Color Correction** procedural map
- o Creating tiled material using the **Tiles** map
- o Adding bumpiness to material using the **Noise** map

26. Standard Materials
- o Basic introduction to **Standard Materials**
- o Adding a **Map** to the diffuse channel
- o Adjusting **Specular** parameters
- o Adjusting **Opacity** and **Refraction**
- o **Multi/Sub-Object** material methodology
- o Randomizing several material over an objects using the **MaterialByElement**
- o Using the **V-Ray Scene Converter**

IN-CLASS PRACTICE 07: [Texturing an Interior with HDF Material] *max file of the scene is provided in class*

27. Texturing Architectural Elements
- o Texturing **Landscape Platform**
- o Texturing a green areas with **Grass**
  [grass map, tiling, VrayDisplacmentMod amount = 0.3 to 0.4, shift = -0.1 to -0.3, 2d mapping]
- o Texturing a real street **Asphalt**
- o Texturing a street **Kerb**
  [sweep modifier, generate mapping coordinates, use real world map size]
- o Creating a swimming pool **Water**
  [Single model face]

SECTION 06: Lighting and Cameras

28. Cameras
- o Exploring the **Standard Camera Parameters**
  [Target camera, free camera, FOV, orthographic projection, clipping planes, type]
- o Showing the **Safe Frames** *[Shift+F]*
- o Choosing an **Aspect Ratio**
- o Using the **Print Size Assistant**
- o Applying **Camera Correction Modifier**
- o The concept of **Exposure Control**
  [Shutter speed, f-number, ISO, depth of field, motion blur]
- o **VRayPhysicalCamera** parameters
  [Focal length, f-number, guess vert., vignetting, white balance, clipping]

29. Working with V-Ray Lights
- o Understanding **CG Lighting**
- o Understanding and manipulating **VRayLight** types and parameters
- o **VRay Light Mtl** in use
- o Lighting with **Self-Illumination** properties
- o Lighting with **Bitmap Textures**
- o Applying a **VRayIES** light
- o **VRay Dome Light** for environment lighting
- o Adjusting **VRaySun**
- o Setting the **V-Ray Exposure Control** in environment settings
- o Working with the **VRayHDRI** for environment lighting
- o Using the **VRay Light Lister**

30. Standard and Photometric Lights
- o Creating a target and free **Spotlight**
  [Light type, shadows, intensity multiplier, color, decay, attenuation, hotspot, and falloff]
- o Using **Direct Light** as sun
- o Creating **Omni** lights
- o Creating **Photometric** target light

31. Configuring 3Ds MAX for MCUBE 3D Library
- o Understanding the **MCUBE 3D Library Structure**
- o Introducing the **V-Ray Proxies**
  [Mesh file, linked to max file, material, attach]
- o **Configuring User Paths** to find your maps
- o **Archiving** an entire scene including all its assets into a single file
- o Controlling Scene assets using **Asset Tracking**
  [Priority no.1 for the defined path, propriety no.2 for in-folder files, priority no. 3 for the library paths]

SECTION 07: Rendering With V-Ray

32. Critical V-Ray Concepts
o **Installing VRay** and setting it as the renderer
o **Why V-Ray** render engine
o **How VRay Works**, understanding the VRay computation workflow

33. Global Illumination
o **Global Illumination** (GI) explained
o Understanding **Primary and Secondary Bounces**
o How **Irradiance Mapping** works
   [HSph. Subdivs: 35 to 70, Interp. Samples: 30 to 50, very low for test, medium to high for final]
o How **Light Cache** works
   [Subdivs: 400 to 800 for test, 1500 to 2500 for final]
o Understanding **Brute Force** GI

34. Working with Color Mapping Modes
o Understanding the **Color Mapping Role** in the rendering process
o Using the **Linear Multiply** mode for contrasted renders
o Using the **Exponential** for avoiding the light burned scenes
o Blending between the linear multiply and the exponential modes using the **Reinhard**
o The **Gamma Correction** curve explained

35. Quality Control with Image Sampling
o **Introduction** to image sampling
o Understanding the **Antialiasing**
o Using the **Fixed**-Rate sampler
o How to use the **Adaptive DMC** sampler
o Working with the **Adaptive Subdivision** sampler
o **Comparing** image sampling **Renders**
o **Locating the Subdivs** parameter in materials and lights

36. Using the VRay Frame Buffer
o **Enabling** the VRay frame buffer
o Using the frame buffer **History Window**
o Rendering only a **Region** of the image
o Viewing **RGB Channels**
o **Tracking** the **Mouse Cursor** while rendering

37. Global Switches in Function
o Enabling and disabling **Displacement** calculations globally over the scene
o Forcing **Back Face Culling**
o Disabling the effect of **Hidden Lights**
o Rendering old scenes with **Legacy VRay** models
o Enabling and disabling **Reflection/Refraction** calculations globally over the scene
o Setting an **Override Material** for the entire scene

38. VRay System Settings
o Configuring the **Dynamic Memory** limit
o Setting the **Render Bucket** size
o **Frame Stamping** rendered images
o Enabling and disabling the **VRay Log** window

o Setting a rendering queue of multiple cameras using the **Batch Renderer**
o Saving **Scene States** and recalling it

39. Image Post-Production with Photoshop
o Controlling the image **Brightness** and **Contrast**
o Adding more color **Saturation** to the render
o Altering the render **Color Balance** using the **Variations** tool
o Adding an artistic glimpse using **Glow** effect

SECTION 08: Student Project

40. Working on Exterior Scene
o **Modeling** the building body
o **Modeling** the building **Surrounding Layout**
o **Applying Materials** and textures to the building and the layout
o Setting the **Environment** and **Lighting**
o **Distributing** the scene **Entourage**
o Applying VRay **Rendering Settings**
o **Test Rendering**
o **Final Rendering**

41. Working on Interior Scene
o **Modeling** a residential space interior
o Distributing the **Scene Furniture** and accessories
o **Applying Materials** and textures to the scene
o Setting the **Environment** and **Lighting**
o Applying VRay **Rendering Settings**
o **Test Rendering**
o **Final Rendering**