Autodesk Maya Fundamentals

Target Audience

This course is ideal for beginners, 3D artists, animators, game developers, and visual effects (VFX) professionals looking to build a strong foundation in Autodesk Maya for modeling, texturing, animation, and rendering.

Course Objective

The course aims to introduce learners to the core functionalities of Autodesk Maya, enabling them to create 3D models, animate objects, apply textures and materials, and render high-quality visuals for films, games, and digital media.

Course Outcome

- Navigate the Maya interface and understand key tools for 3D modeling and animation.
- Create and manipulate 3D models using polygonal and NURBS modeling techniques.
- Apply textures, materials, and lighting to enhance the visual appeal of 3D scenes.
- Develop basic animations and render realistic scenes using Maya's rendering engines.

Course Outline: The course comprises **40-hours** of theory and labs and is divided into **17** different chapters. Each chapter will be followed by **hands-on lab exercises** to reinforce learning and gauge understanding of the topics covered.

Chapter 1. Exploring Maya Interface

Introduction to Autodesk Maya
Starting Autodesk Maya
Autodesk Maya Screen Components

- Menu bar
- Status Line
- Shelf
- Tool Box
- Time Slider and Range Slider
- Command Line
- Help Line
- Panel Menu
- Panel Toolbar
- Channel Box / Layer Editor
- Attribute Editor

Hotkeys
Hotbox
Outliner
Marking Menus
Pipeline Caching

- Alembic Cache

Interoperability Options in Maya
Navigating the Viewports

- Hotkeys in Maya
- Tips and Tricks in Maya

Workspaces

Chapter 2. Polygon Modeling

Introduction
Polygon Primitives

- Creating a Sphere
- Creating a Cube
- Creating a Prism
- Creating a Pyramid
- Creating a Pipe
- Creating a Helix
- Creating a Soccer Ball

- Creating a Platonic Solid
- Creating a Type Tool Mesh
- Creating a SVG Mesh
- Creating a Disc
- Creating a Gear
- Creating Super Shapes

Polygon Editing Tools

- Booleans
- Combine
- Separate
- Conform
- Fill Hole
- Reduce
- Remesh
- Retopologize
- Smooth
- Triangulate
- Quadrangulate
- Mirror

Editing the Polygon Components

- Add Divisions
- Bevel
- Bridge
- Circularize
- Collapse
- Connect
- Detach
- Extrude
- Merge
- Average Vertices
- Chamfer Vertices
- Delete Edge/Vertex
- Edit Edge Flow
- Duplicate

Editing the Polygon Components Using Mesh Tools

- Create Polygon
- Insert Edge Loop
- Multi-Cut
- Offset Edge Loop

Chapter 3. NURBS Curves and Surfaces

Introduction
NURBS Primitives
- Creating a Sphere
- Creating a Cube
- Creating a Cylinder
- Creating a Cone
- Creating a Plane
- Creating a Torus
- Creating a Circle
- Creating a Square
- Interactive Creation
- Exit on Completion

Working with NURBS Components
Tools for Creating NURBS Curves
- CV Curve Tool
- EP Curve Tool
- Pencil Curve Tool
- Arc Tools
- Bezier Curve Tool

Tools for Creating Surfaces
- Loft Tool
- Planar Tool
- Revolve Tool
- Birail Tool
- Extrude Tool
- Boundary Tool
- Square Tool
- Bevel Tool
- Bevel Plus Tool
- Sweep Mesh Tool

Chapter 4. NURBS Modeling

Introduction
Working with NURBS Tools
- Duplicate NURBS Patch

Project Curve on Surface
Intersect
Trim Tool
Untrim
Attach
Attach Without Moving
Align
Detach
Open/Close
Extend
Insert Isoparms
Offset
Rebuild
Reverse Direction
Sculpt Geometry Tool
Converting Objects 4-15

- Converting NURBS to Polygons
- Converting NURBS to Subdiv

Chapter 5. UV Mapping

Introduction
UV Mapping
UV Editor

- View Toolbar
- UV Toolkit
- Pinning
- Select By Type
- Soft Selection
- Transform
- Create
- Cut and Sew
- Unfold
- Align and Snap
- Arrange and Layout

Chapter 6. Shading and Texturing

Introduction

Working in the Hypershade Window
- Create Panel
- Browser Panel
- Browser Panel Toolbar
- Work Area

Property Editor
- Common Material Properties
- Bump/Normal Mapping
- Special Effects

Exploring the Shaders
- Surface
- Standard Surface Shader

Chapter 7. Lights and Cameras

Introduction
Types of Lights
- Ambient Light
- Directional Light
- Point Light
- Spot Light
- Area Light
- Volume Light

Glow and Halo Effects
- Optical FX Attributes Area

Light Linking
Cameras
- Camera
- Camera and Aim
- Camera, Aim and Up
- Stereo Camera
- Multi Stereo Rig

Chapter 8. Animation

Introduction
Animation Types
- Keyframe Animation
- Effects Animation

- Nonlinear Animation
- Path Animation
- Motion Capture Animation
- Technical Animation

Animation Controls

- Playback Controls
- Animation preferences

Commonly Used Terms in Animation

- Frame Rate
- Range
- Setting Keys

Understanding Different Types of Animations

- Path Animation
- Keyframe Animation
- Nonlinear Animation

Key Menu

- Working with Keys

Visualize Menu

Playback Menu

- Playblast
- Cached Playback
- Select Next Key
- Select Previous Key

Audio Menu

Graph Editor

- Move Nearest Picked Key Tool
- Insert Keys Tool
- Lattice Deform Keys
- Region Tool: Scale or move keys
- Retime Tool: Scale and ripple keys
- Fit selection in all panels
- Frame playback range
- Center the view about the current time
- Auto tangents (Legacy)
- Auto tangents (Ease)
- Auto tangents (Mix)
- Auto tangents (Custom)
- Spline tangents
- Clamped tangents

- Linear tangents
- Flat tangents
- Step tangents
- Plateau tangents
- Buffer curve snapshot
- Swap buffer curves
- Break tangents
- Unify tangents
- Free tangent length
- Lock tangent length
- Auto load Graph Editor on/off
- Load Graph Editor from selection
- Time snap on/off
- Value snap on/off
- Display curve in absolute view
- Display curve in normalized view
- Display curve in stacked view
- Renormalize curves
- Pre-infinity cycle
- Pre-infinity cycle with offset
- Post-infinity cycle
- Post-infinity cycle with offset
- Unconstrained drag
- Open the Dope Sheet
- Open the Trax Editor

Animation Layers

- Creating an Animation Layer
- Animation Layer Pane
- Creating the Parent-Child Relationship in the Animation Layer Editor

Chapter 9. Rigging, Constraints, and Deformers

Introduction
Bones and Joints
Creating a Bone Structure

- Types of Joints

Parent-Child Relationship
Kinematics
Deformers

- Blend Shape Deformer
- Curve Warp Deformer
- Cluster Deformer
- Delta Mush Deformer
- Lattice Deformer
- Wrap Deformer
- ShrinkWrap Deformer
- Pose Space Deformation Deformer
- Soft Modification Deformer
- Nonlinear Deformer

Applying Constraints

- Parent Constraint
- Point Constraint
- Aim Constraint
- Orient Constraint
- Scale Constraint
- Geometry Constraint
- Normal Constraint
- Tangent Constraint
- Pole Vector Constraint
- Rivet Constraint
- Point On Poly Constraint
- Closest Point Constraint

Adding Constraints to Animation Layers
HumanIK Character Controls
Skinning an Object

- Paint Skin Weights Tool
- Go to Bind Pose Tool

Maya Muscle Deformer

- Muscle Objects
- Types of Muscles
- Muscle Creator

Chapter 10. Paint Effects

Introduction
Working with the Content Browser Window

- Creating Objects

Working with the Paint Effects Window

- Brush Type
- Global Scale
- Channels
- Brush Profile
- Twist
- Mesh
- Shading
- Illumination
- Shadow Effects

Chapter 11. Rendering

Introduction
Render Setup
Maya Software Renderer
Maya Hardware Renderer
- The Maya Hardware Renderer Settings

Arnold Renderer
Working With Lights
- Working with Maya Lights
- Working with Arnold Lights

Standard Shader
- Base
- Specular
- Transmission
- Bump Mapping
- Emission
- Matte

Chapter 12. Particle System

Introduction
Creating Particles
- Tool Settings (Particle Tool) Panel

Creating Emitters
- Emitter name
- Basic Emitter Attributes Area
- Distance/Direction Attributes Area

- Basic Emission Speed Attributes Area

Creating Goals
Colliding Particles

- Resilience
- Friction
- Offset

Rendering Particles
Animating Particles Using Fields

- Air
- Drag
- Gravity
- Newton
- Radial
- Turbulence
- Uniform
- Vortex
- Volume Axis

Creating Effects

- Creating the Fire Effect
- Creating the Smoke Effect
- Creating the Fireworks Effect
- Creating the Lightning Effect
- Creating the Shatter Effect
- Creating the Curve Flow Effect
- Creating the Surface Flow Effect

Chapter 13. Introduction to nParticles

Introduction
Creating nParticles
nParticle Attributes

- nParticleShape1 Tab
- nucleus1 Tab

Chapter 14. Fluids

Introduction
Classification of Fluid Effects

- Open Water Fluid Effects

- Dynamic Fluid Effects
- Non-Dynamic Fluid Effects

Working with Fluid Containers

- Attributes of Fluid Container
- Creating Fluid Containers with Emitter
- Painting the Fluid Effects into Containers

Fluid Components

- Ocean
- Pond

Fluid Effects

Chapter 15. nHair and XGen

Introduction
nHair

- Creating nHair

Simulating nHair

- hairSystemShape1 Tab
- Painting Texture on nHair
- Painting Follicle Attributes
- Styling nHair
- Applying Shadow to the nHair
- Rendering the nHair

XGen

- Create new description Button
- Import collections or descriptions
- XGen Tab

Chapter 16. Bifrost

Introduction
Flip Solver
Working With Bifrost Fluids

- bifrostLiquidContainer1 Tab
- liquidShape1 Tab

Working with Bifrost Aero
Emitters

- Adding Emitter
- Removing Emitter

Colliders
- Adding Colliders
- Removing Colliders

Caching a Simulation to Disk
- Flush Scratch Cache
- Compute and Cache to Disk

Working with the Bifrost Browser Window and Bifrost Graph Editor Window
- Creating Bifrost Simulation Using
- the Bifrost Browser Window

Foam
- Remove Foam

Chapter 17. Bullet Physics and Motion Graphics

Introduction

Bullet Objects
- Creating Active Rigid Body
- Creating Passive Rigid Body
- Creating Soft Body
- Rigid Body Constraint
- Soft Body Anchor
- Soft Body Vertex Properties

MASH Menu
- MASH1_Distribute
- MASH1
- MASH Shelf