



CURRICULUM OUTLINE

Introduction to 3D With CINEMA 4D

First Edition



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INTRODUCTION

What follows is an outline of how your 3D class using CINEMA 4D XL can be structured. This curriculum is in a modular format; you are welcome to use the sections as needed for your class. However, it is recommended that you at least touch on each of these areas. Page numbers relating to more information in the reference and tutorial manuals are listed in brackets next to each item.

There are four areas of discipline when creating 3D animation — Modeling, Materials and Texturing, Lighting and Animation. Each of these disciplines can take years to master. A young animator may find he/she is better at one aspect than another, but it is important that a 3D artist have experience in all areas as each affects the other (i.e. how a model is built affects how it will be textured and animated later). For this reason, the curriculum is structured to focus on these four disciplines separately, while still maintaining a “project-based” flow to keep it interesting.

SECTION I - BASICS

Part One, Introduction

(An overview of the 3D environment.)

1. Navigating in a 3D Environment
 - Understanding Views
 - The World Grid
 - X,Y, Z Coordinate System
 - H, P, B Coordinate System
 - Coordinate Manager
 - Moving an Object
 - Rotating an Object
 - Scaling an Object
 - Selecting Objects
 - Making a Primitive Object Editable
 - Selection Tools
 - Selection Control
 - Active Tool Manager
 - Selection Modifiers
 - Structure Tools

Part Two, Modeling

(An overview of modeling types and terms.)

1. The Building Blocks of 3D
 - Primitives
 - Splines
 - Vector Art
 - Type/Text
 - Normals
 - NURBS
 - Extrude
 - Lathe
 - Loft
 - Sweep
 - Bezier
 - Construction Tools
 - Boolean
 - Fractals
 - Deformations
 - Subdivision Surfaces
 - Hyper NURBS

Part Three, Materials and Textures

(An overview of materials and texturing.)

1. Understanding Styles (what type of image do they want to create?)
 - Cartoon-like to Photorealism (what's the difference and how to achieve)
 - [Add any and all art classes and art disciplines here]
 - Material Channels
 - Color
 - Diffusion
 - Luminance
 - Transparency
 - Reflection
 - Environment
 - Fog
 - Bump
 - Alpha
 - Specular
 - Specular Color
 - Glow
 - Displacement
 - Textures
 - Image-based Maps
 - Texture map size
 - 2D procedural textures
 - 3D procedural textures
 - COFFEE Textures
 - Texture Map Interpolation
 - Material Projection
 - Flat
 - Cubic
 - Cylindrical
 - Spherical
 - Frontal
 - Spatial
 - Shrink-wrap
 - UVW
 - Decal
 - Creating Textures
 - Editing existing textures
 - Adding imperfection to surfaces
 - Adding materials to complex models
 - Economical texturing
 - Layering materials

Part Four, Lighting

(An overview of lighting terms and techniques.)

1. Creating depth with light
 - [Any and all references from film and stage lighting books are pertinent]
 - Key, Fill and Back Lighting
 - Intensity and Diffusion
 - Positioning Lights in a scene
 - Color and light
 - Mixing Colors
 - Visibility
 - Shadows
 - Animating lights
 - Gobos

Part Five, Animation

(An overview of animation techniques.)

1. Visual Composition
 - How to draw your audience attention
 - The placement of objects in a scene
 - Objects at rest and moving
2. Camera Angles
 - The relationship of the camera to objects
 - Framing your shots
 - Basic camera shots (most commonly used)
3. Animation
 - Putting objects into motion
 - Traditional Animation Techniques
 - The speed of motion
 - Animation tracks
 - Sequences
 - Keyframes
 - Formula Animation
 - Motion Mixing and Sequencing (non-linear animation)
 - Animating Cameras
 - Particle Systems
 - Emitters and its controls
 - Flow modifiers (deflect, gravity, etc.)
 - Using objects as particles
 - Animated objects as particles
 - Emitting lights as particles

Part Six, Rendering

1. Rendering Modes
 - Wireframe
 - Comic Rendering
 - Raytracing
2. Antialiasing*
 - Oversampling
3. Shadows
 - Hard Shadows
 - Soft Shadows
 - Area Shadows
4. Frames, Fields & Frame Rates
5. File Formats
6. Alpha Channels
7. Depth Channels
8. Depth of Field
9. Motion Blur
10. Rendering Tags

SECTION II – Animation Projects

Part One, How to Approach a Project

Once you've covered the basics of each discipline, before students begins working on a project, they should understand how to approach a project in the most efficient manner.

1. Structure
2. Storyboarding
3. Production Flow
4. Project Structure
5. Post Production

Part Two, The Flying Logo Project

Flying logos and broadcast titles is the bread and butter of most 3D animators. This type of design work is where many future 3D artists will make their living. An extensive 3D logo scene is the first tutorial in the CINEMA 4D XL v6 Tutorial Manual.

Part Three, The Indoor Project

Architecture and interior visualization is another strong industry for 3D animators. The second project in CINEMA 4D XL v6 Tutorial Manual takes your students through the process of creating an entire living room scene. Proceed with only the modeling, materials and lighting sections of this project. Save the animation for later.

Part Four, The SciFi Project

Inspired by Star Wars and the other countless movies, the SciFi scene is usually the first thing a young animator is inspired to create. The third project in the Tutorial Manual gives your students a chance to explore this genre.

Part Five, The SciFi Project Adding On

By now your students will have a grasp at the basics of putting together a scene and adding simple animation. Here we suggest you encourage your students to take the SciFi scene and add their own animated story. Give them a chance to express themselves with their new skills.

1. Storyboarding
 - First have the students map out how the story will unfold. Whether written or actually storyboarded. Make sure the students "prepare" their scene before creation.
 - Make sure the students are using new animation techniques to tell their story.
 - Explosions using particles and explosions.
 - Use lights to create lasers
 - Deformations to simulate damage on a ship.
2. Creating the Story with their Scene
 - Once the storyboard for how they will enhance their sci fi scene is done, they should then execute the animation as planned.

SECTION III – Character Animation

Part One - Inanimate Objects

Ultimately, most students will want to do character animation. Unfortunately, it is also the most complex work in 3D. It is important to know that even the most professional animator still struggles with creating realistic motion. A great place to start is with inanimate objects.

1. Animating with Deformations
 - Go back to the Indoor Scene and complete the animation part of the project. This will give students a good starting place with character animation.
2. Exploring Character Motion
 - After completing this scene, students should have a good grasp of animating the remote using deformations. Now, like the sci fi scene, have the students add their own "personalized" animation to the remote character. The scope of this motion and your expectations should be suited to the skill level of each individual student.

Part Two, Character Animation - Bones

Here we are into a very complex part of 3D animation. This is the type of skill taught in master classes. Even these are rare as skilled character animators may far more money animating than they do teaching classes. There is a short bone tutorial using a simple hand on the web site. This is a great start, but more will be added later.

1. Bones: what they are and how they work.
 - Creating bones
 - Positioning Bones
 - Setting a Bone's Radius and interpolation
 - Fixing bones
 - Animating Bones
2. Vertice Selections
 - Making a selection
 - Saving a selection
 - Weighting a selection
 - Applying a bone to a selection

Section IV – Custom Programming

This will be most attractive to advanced students and/or programming major. There are 32 well documented Expressions on the product CD-ROM. These can be used as a start. COFFEE programming tutorials are coming as well. There students should be encouraged to visit MAXON's plugin development support site (www.plugincafe.com).

1. Programming in COFFEE
 - Creating a texture
 - Writing an Expression
 - Creating a plugin

ONLINE RESOURCES

Tutorials Online: Currently there are about 60 tutorials on the MAXON USA web site (www.maxoncomputer.com=>Support). Approximately two new tutorials are added each month. Many of the topics listed in the curriculum are explained in the tutorials.

FAQs: This new feature to the MAXON USA web site is a fully searchable online database of frequently asked questions. The database is updated monthly directly from our internal tech support database.

Discussion Forums: There are many online discussion groups where students can learn tips and tricks, pick up new techniques, see other animators' work and generally learn a lot about 3D animation.

The two most popular CINEMA 4D forums are:

Postforum: www.postforum.com

Toolfarm: www.toolfarm.com

It is important to encourage students to read the forums for a month or so before participating. This will give them a chance to absorb some ideas and concepts, as well as the climate of the forum. The forum participants can be very helpful. However, they can be unforgiving of ignorant, aggressive or uninformed postings. On these forums, a first impression is very difficult to change. Post judiciously. Many of the forums have a search mechanism for exploring forum archives. Students should search for their topic before posting, as many simple questions may have already been answered and a repeated question may go unanswered for this reason.

Later they should be encouraged to post their work for feedback from the community. Generally, response will be kind and constructive. However, be aware, because of the anonymous nature of the forum, some can be overly critical and even rude. Help your students filter the criticism.

The forums are an invaluable resource. You will find the quality of students' work will improve based on the comments of those on the forums. In addition, students will realize the importance of certain concepts, not because the professor "says" so, but because they have heard from other animators and seen the proof in others' work.

Recommended Course Work

For Modeling: any art class, sculpting, ceramics, architecture, engineering, math, geometry, etc.

For Materials: any art class, textiles, Photoshop, Illustratort, etc.

For Lighting: drama, stage lighting, film and television lighting, architectural lighting, photography, etc.

For Animation: physics, drama, animal husbandry, dance, gymnastics, traditional animation (claymation, 2D, stop motion), etc.

For Custom Programming: Java, C, C++, foreign languages, etc.

3D Animation — Reference Material

These are all general 3D Animation books. There are dozens more listed on our web site (www.maxoncomputer.com). You will even find specific books on programming, lighting, texturing, character animation and more on our site.

3D Computer Graphics
Author: Allan Watt, Alan Watt

Becoming a Computer Animator
Author: Mike Morrison

3D Computer Animation
Author: John Vince

The Mac 3D Handbook
Author: Craig Lyn

Let There Be Life!: Animating With the Computer
Author: Christopher W. Baker

3D Computer Graphics: A User's Guide for Artists and Designers
Author: Andrew S. Glassner

3D Graphics and Animation From Starting Up to Standing Out
Author: Mark Giambruno

Timing for Animation
Author: Halas/Whitaker

Morphing and Animation
Author: Michele Bousquet and Glenn Melenhorst

3D Graphics: Tips, Tricks & Techniques
Author: David J. Kalwick

Principles of Three-Dimensional Computer Animation
Author: Michael O'Rourke

Animation and Scientific Visualization: Tools and Applications
Authors: R.A. Earnshaw and D. Watson

Cartoon Animation
Author: Preston Blair

Computer Graphics and Animation for Corporate Video
Authors: Stephen Wershing and Paul Singer

3D Starter Kit
Author: Sean Wagstaff

Animation 101
Author: Ernest Pintoff

Animation and 3D Modeling

Authors: Don and Melora Foley

Animators Workbook

Author: Tony White

Animation from Script to Screen

Author: Shamus Culhane

3D Photorealism Toolkit

Author: Bill Fleming

The Art of 3D Computer Animation and Imaging

Author: Isaac Victor Kerlow

Digital Architecture: Turn Vision into Virtual Reality

Author: Mohammed Saleh Uddin

The Illusion of Life: Disney Animation

Authors: Frank Thomas & Ollie Johnston

Creating 3-D Animation: The Aardman Book of Filmmaking

Author: Peter Lord, Brian Sibley, Aardman Animations

Getting Started With 3D

Author: Janet Ashford, John Odam, Victor Gavenda

Advanced Animation and Rendering Techniques

Authors: Alan H. Watt and Mark Watt