Unreal Engine Training

Course Catalog Fall 2020

Contents

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Image courtesy of Valentin Bécart | Odilon Loïez | Digital art by Studio A N F

Curriculum building blocks

Combine the following learning paths to build a curriculum that meets your needs.

General introduction to Unreal Engine - 3 days

- 100.1 Introduction to Unreal Engine (self-paced learning video)

1. 100.2 Quick Start: Your First Project in Unreal Engine
2. 101.1 Materials - Introduction
3. 103.1 Lighting - Introduction
4. 102.1 Blueprint - Introduction
5. 102.2 Blueprint - Introduction to UMG and Creating Simple User Interfaces
6. 105.2 Sequencer - Introduction
7. 206.2 Static Mesh Ingestion for AEC
8. 206.1 Static Mesh Ingestion with FBX
9. 204.1 Optimization - Introduction

Artists and designers deep dive - additional 2 days

1. 201.1 Materials - Masking and Material Functions
2. 201.2 Materials - Translucent, Displacement, and VFX
3. 203.2 Lighting - Cinematic Fundamentals
4. 203.3 Lighting - Ray Tracing, Atmospheric Lighting, and Optimization
5. 209.1 Post Processing and Rendering for Virtual Production
6. 204.2 Optimization Challenge

Image courtesy of ZOAN

Tech artists and developers deep dive - additional 2 days

202.1 Blueprint - Set up for Scalability: Interface System and Parent/Child Classes

202.2 Blueprint Project - Your First Mobile Application with Blueprint and UMG

202.3 Blueprint - Introduction to Creating Custom Tools with Blueprint Construction Scripts

206.2 Static Mesh Ingestion for AEC

206.4 Automation and Visual Dataprep

204.2 Optimization Challenge

Virtual production deep dive - additional 2 days

1. 102. 3 Quickstart - Blueprint for Virtual Production
2. 105.1 Quick Start - Sequencer for Virtual Production
3. 205.1 Sequencer - Production Workflow and CineCamera Techniques
4. 205.3 Sequencer - VCam Shot Creation and Editing
5. 205.2 Sequencer - Performance Capture with Take Recorder
6. Live Q & A

Animation deep dive - additional 2 days

1. 107.1 Animation - Importing and Subeditors
2. 107.2 Animation - Retargeting and Reusing Animations
3. 207.1 Animation - Advanced Importing & Live Link
4. 207.2 Animation - Blending Controls
5. 207.3 Animation - Control Rig
6. Live Q&A

Image courtesy of Andrew Svanberg Hamilton

Course descriptions

Introduction

100.1 Introduction to Unreal Engine

This course provides an overview to the engine as well as examples of how businesses are creating stunning real-time visuals for film, television, theater, architecture, design, and manufacturing.

The presentation also provides a high-level understanding of game engine principles along with an overview of the Unreal Editor and its various tools.

By the end of this class, participants will be able to:

- Explain what the Epic Games launcher is used for
- Utilize the online learning resources
- Utilize sample projects and other resources, including free and paid content
- Understand and work with Unreal Engine's project structure
- Explain how to bring in data such as geometry, lights, cameras, animation, and more
- Navigate in a scene
- Find their way around the Unreal Engine Editor and utilize some of the most common tools
- Explain the concepts of Physically Based Rendering (PBR) and how they affect Materials in Unreal Engine
- Differentiate dynamic versus static lighting
- Explain the basics of the Blueprint visual scripting system

Prerequisites:

Download and install Unreal Engine

Image courtesy of Quixel

100.2 Quick Start: Your First Project in Unreal Engine

In this beginner class, you will create a simple project that showcases a typical workflow in Unreal Engine.

At the end of this class, participants will be able to:

- Start a project using a base template
- Get content from the Marketplace and load starter content
- Import data using Datasmith and FBX
- Place, transform, and duplicate assets to create an environment
- Light an exterior scene using different light types and mobility settings
- Create and apply simple Materials
- Create a basic terrain and sculpt with terrain editing tools
- Add foliage with the Foliage Paint and editing tools

Prerequisites:

100.1 Introduction to Unreal Engine

Materials

101.1 Materials - Introduction

In this class, you will learn introductory material techniques in Unreal Engine.

At the end of this class, participants will be able to:

- Create Material Masters and Material Instances
- Animate Materials using the Panner node and layering
- Create Materials using Materials parameters for alpha channels
- Control Material domains, Blend modes, and Shading Models

Prerequisites:

100.1 Introduction to Unreal Engine

201.1 Materials - Masking and Material Functions

In this class, you will learn intermediate material techniques in Unreal Engine.

At the end of this class, participants will be able to:

- Make an Instance Material to control UVs
- Switch between a color or texture as well as values of Material properties
- Use a Material function to make an Emissive Material and attach it to a light
- Create a single Material that uses masking techniques

Prerequisites:

101.1 Materials - Introduction

201.2 Materials - Translucent, Displacement, and VFX

In this class, you will learn advanced material techniques in Unreal Engine.

At the end of this class, participants will be able to:

- Create plant Materials using Shading Models and subsurface options
- Create a dissolve effect using Material functions
- Create a translucent Material and add secondary effects such as Bump Offset
- Create displacement Materials using the Material settings

Prerequisites:

101.1 Materials - Introduction
201.1 Materials - Masking and Material Functions

Lighting

103.1 Lighting - Introduction

In this class, you will learn the basics of Unreal Engine lighting.

At the end of this class, participants will be able to:

- Apply different light types and properties in different scenarios
- Explain the three states of light mobility
- Differentiate between static and dynamic lighting
- Use Lightmass efficiently to bake lighting and shading info onto geometry
- Utilize Lightmaps for optimal performance
- Leverage Lightmass Importance Volume and Post-Process Volume
- Understand and use the different reflection types offered in Unreal Engine

Prerequisites:

100.1 Introduction to Unreal Engine

203.2 Lighting - Cinematic Fundamentals

In this class, you will learn the basics of cinematic lighting in Unreal Engine.

After completing this course, you will be able to:

- Create realistic lighting for environments
- Control exposure with Viewmode Exposure and Post-Process Effects
- Control outdoor and interior lighting
- Use Screen Space Global Illumination
- Light a character

Prerequisites:

100.1 Introduction to Unreal Engine

203.3 Lighting - Ray Tracing, Atmospheric Lighting, and Optimization

In this class, you will learn additional intermediate lighting techniques.

At the end of this class, you will be able to:

- Create a scene that uses ray-traced lighting Actors
- Create Materials and attach them to Post-Process Effects for stylized visual looks
- Add atmospheric lighting to fog to create an effect
- Create Blueprints for ray-tracing optimization

Prerequisites:

100.1 Introduction to Unreal Engine

209.1 Post Processing and Rendering for Virtual Production

In this class, you will learn post production and final render techniques within Unreal Engine.

At the end of this class, you will be able to:

- Use LUT for color grading
- Use Post-Process Volumes to control the color of a scene
- Explain post-process exposure control in the viewport
- Render image sequences using the Movie Render Queue
- Explain how to create custom render passes
- Export data from Unreal Engine for use in offline editing

Prerequisites:

203.2 Lighting - Cinematic Fundamentals
203.3 Lighting - Ray Tracing, Atmospheric Lighting, and Optimization
205.2 Sequencer - Production Workflow and CineCamera Techniques

Static Mesh Ingestion

206.1 Static Mesh Ingestion with FBX

In this class, you will learn the basics of Static Mesh import with FBX. This interop format is the most common way of importing models into Unreal Engine and works well when sorting assets one at a time.

At the end of this class, participants will be able to:

- Import Static Meshes and discover the options of the FBX Import dialog box
- Utilize Unreal Engine's Mesh Editing tools to make minor adjustments inside of the engine
- Organize Texture and Lightmap UVs in both DCC apps and inside of Unreal Engine
- Generate Collision objects in both your DCC app and inside of Unreal
- Generate LODs
- Import Skeletal Meshes
- Utilize the FBX Full Scene Import option to import fully assembled scenes

Prerequisites:

100.1 Introduction to Unreal Engine

206.2 Static Mesh Ingestion for AEC

In this class, you will learn the basics of Static Mesh import for architectural models created in digital content creation (DCC) applications such as Autodesk 3ds Max, Autodesk Revit, or Trimble Sketchup Pro.

At the end of this class, participants will be able to:

- Recognize the impact the Datasmith file format and workflow has on project development
- Assess how Datasmith works and how it parses information
- Download and install Datasmith exporters for specific DCC applications
- Recognize how Datasmith handles hierarchies and pivot points for imported objects
- Utilize the Mesh Editing tools to make adjustments to geometry from within Unreal Engine
- Generate Collisions for a mesh using the Static Mesh Editor
- Generate LODs for a mesh using the Static Mesh Editor
- Recognize the significance of merging Actors in a scene to improve performance

Prerequisites:

100.1 Introduction to Unreal Engine

206.3 Static Mesh Ingestion for CAD

In this class, you will learn the basics of Static Mesh import for CAD data created in applications such as Solidworks, Catia, Rhino, Inventor, and many others.

At the end of this class, participants will be able to:

- Recognize the impact the Datasmith file format and workflow has on project development
- Deconstruct tessellation of CAD geometry to determine how coarse or fine it appears inside of Unreal Engine
- Utilize Mesh Editing tools to make adjustments to your geometry directly inside of Unreal Engine
- Generate LODs for a mesh in Unreal Engine using the Static Mesh Editor
- Improve performance by merging Actors and generating Proxies

Prerequisites:

100.1 Introduction to Unreal Engine

206.4 Automation and Visual Dataprep

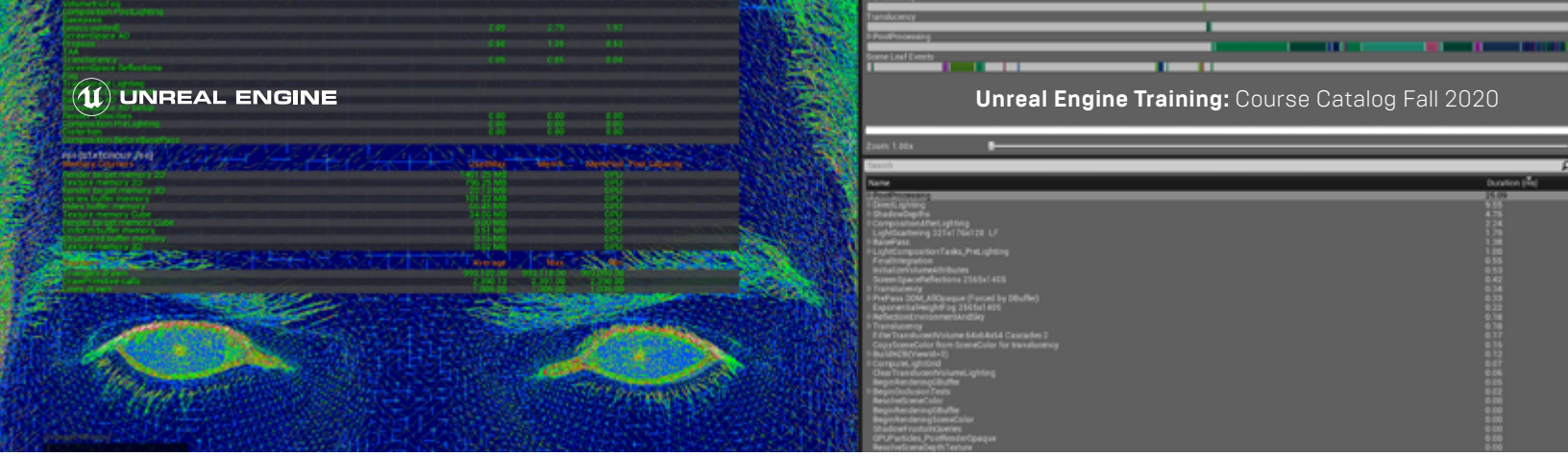
In this class, you will learn how to work with Unreal Engine's Visual Dataprep tools to sift through a Datasmith file and make changes and adjustments before you commit to importing it into Unreal Engine.

At the end of this class, participants will be able to:

- Assess the importance of automating the Datasmith import process
- Discover Python scripting automation to load a Datasmith file
- Utilize Python scripting to generate LODs and replace materials quickly and efficiently
- Discover Visual Dataprep
- Assess the Visual Dataprep workflow and recognize how it can help the process of Datasmith ingestion
- Develop "recipes" to automate cleanup and scene management before you commit the changes to the Unreal Editor

Prerequisites:

206.2 Static Mesh Ingestion for AEC
or
206.3 Static Mesh Ingestion for CAD



Optimization

204.1 Optimization Introduction

This class introduces optimization concepts and profiling tools and techniques.

At the end of this class, you will be able to:

- Understand fundamental optimization concepts
- Utilize the optimization view modes to identify performance issues in your scenes
- Be able to use the Audit Asset tools to determine which assets are taking up the most memory/disk space
- Understand when to use the built-in optimization tools and why one tool should be used over another
- Optimize Meshes, Textures, Materials and lighting using built-in tools
- Understand ways to increase ray tracing scene performance

Prerequisites:

100.1 Introduction to Unreal Engine

204.2 Optimization Challenge

In this hands-on workshop, we introduce you to a variety of profiling and optimization tools available within Unreal Engine, and you'll explore commonly used techniques such as mesh instancing, LODs, HLODs, culling methods, merge Actors, lighting modes, and viewport visualizations to increase performance. You will begin with a performance-heavy scene, and together we will optimize it. By the end of the session, you will have the sample scene running smoothly and the skills required to analyze, profile, and optimize any scene in your own projects.

At the end of this class, you will be able to:

- Quickly identify issues that could be contributing to performance problems
- Balance your project's visual needs and performance goals
- Understand how to use the GPU profiling tools to locate performance issues in a scene

Prerequisites:

204.1 Optimization - Introduction

Sequencer

105.1 Quick Start - Sequencer for Virtual Production

In this class, you will learn how to set up your first virtual production project and explore hands-on virtual camera (vCam) controls. If you'll be working with Unreal Engine in virtual production, this is the introductory class for you.

At the end of this class, you'll be able to:

- Install virtual production plugins
- Understand sequence management
- Animate CineCameras using Sequencer
- Create a simple shot sequence in Sequencer
- Set up vCam using Unreal Remote 2 app for camera recording
- Set up Live Link Face App for facial capture

Prerequisites:

100.1 Introduction to Unreal Engine

Additional resources:

https://docs.unrealengine.com/en-US/Engine/Plugins/VirtualCameraPlugin/index.html

105.2 Sequencer - Introduction

In this class, you will learn the basics for working with Unreal Engine's cinematic creation tool, Sequencer.

At the end of this class, participants will be able to:

- Understand the different functions of a sequence in Unreal Engine, including the hierarchical difference between shot sequences, a sub level track, and a take
- Build their first cinematic sequence with keyframed cameras, animations, and cuts
- Generate rendered movies from Sequencer using the Render Movie setting

Prerequisites:

100.1 Introduction to Unreal Engine

205.1 Sequencer - Production Workflow and CineCamera Techniques

In this class, you will discover additional features in Sequencer, explore organization structures, and utilize Sequencer's editing capabilities through the application of new CineCamera tools and Modification tracks.

At the end of this class, participants will be able to:

- Explain the use of subscenes to organize tracks for visual effects, audio, and animation, and to trigger events between tracks or communicate between tracks
- Blend shots in the camera cuts track using the Curve Editor as well as use Look At and Focus tracking to follow a subject within those shots
- Utilize the Curve Editor for key manipulation
- Utilize cinematic camera tools, rig rail, and crane to animate the camera
- Apply various tools such as visibility, transform, time dilation, and fade tracks to refine the animation

Prerequisites:

105.2 Sequencer - Introduction

205.2 Sequencer - Performance Capture with Take Recorder

In this class, you will cover setting up recordable Actors and CineCameras, placing them in a virtual set, and recording physical and facial performances through Take Recorder.

By the end of this class, you should be able to:

- Create performance takes with Take Recorder
- Record camera motion with the Unreal Remote 2 App
- Record Actor body mechanics performances in Take Recorder
- Record facial capture performances with Live Link Face App
- Attach facial capture onto an animated character
- Record cinematic character animation

Prerequisites:

205.1 Sequencer - Production Workflow and CineCamera Techniques
207.3 Animation - Control Rig

205.3 Sequencer - vCam Shot Creation and Editing

In this class, you will cover setting up recordable effects, placing them in a virtual set, and recording hand-held virtual cameras and audio takes through Take Recorder for editing into a film sequence.

Topics include:

- vCam overview and UI
- Foley audio recording
- Shot creation and assembly

By the end of this class, you should be able to:

- Navigate the Virtual Camera interface
- Create takes in Virtual Camera with Take Recorder
- Illustrate how to use the Blueprint for Virtual Camera
- Record physics and effects simulations in Take Recorder
- Record Foley with Take Recorder
- Edit recorded shots into a film sequence

Prerequisites:

205.2 Sequencer - Performance Capture with Take Recorder

Blueprints

102.1 Introduction to Blueprint

In this class, you will learn basic Blueprint tools and concepts and create a simple interaction.

Topics include:

- vCam overview and UI
- Foley audio recording
- Shot creation and assembly

By the end of this class, should be able to:

- Differentiate the Level Blueprint and Actor Blueprint
- Select the appropriate Blueprint parent class
- Explain inheritance and build a parent/child relationship in Blueprints
- Identify common/basic variable types (nodes, wires, and pins)
- Create, set, and get basic variables
- Recognize how local variables and functions work in Blueprints
- Utilize Blueprint nodes to control the logic flow
- Execute a simple Blueprint

Prerequisites:

100.1 Introduction to Unreal Engine

102.3 Quickstart - Blueprint for Virtual Production

In this class, you'll learn basic concepts and create your first Blueprints.

By the end of this class, you should be able to:

- Control cameras through interaction
- Differentiate the Level Blueprint and Actor Blueprint
- Identify common/basic variable types (nodes, wires, and pins)
- Have a basic understanding of how variables and functions work
- Differentiate Level Blueprint and construction scripts
- Execute a simple Level Blueprint
- Create a simple construction script

Prerequisites:

100.1 Introduction to Unreal Engine

102.2 Introduction to Creating User Interfaces with UMG and Blueprints

In this class, you will learn to create a basic user interface using Unreal Motion Graphics (UMG) and Blueprint. You'll build a small game with simple menu controls and the ability to display data.

By the end of this class, you should be able to:

- Bind data to displays and display text
- Create a menu with working buttons using UMG
- Apply input core concepts and set up pawn/controller communications
- Differentiate UMG functions and Blueprint
- Differentiate construction script, bindings, and tick behavior
- Send variable information via Blueprint communications
- Utilize Casting/Basic communication between UI and other Blueprints to display values of Blueprint Actors via UMG

Prerequisites:

102.1 Introduction to Blueprint

202.1 Blueprint Set Up for Scalability: Interface System and Parent/Child Classes

In this class, you will learn how to set up Blueprints to act as templates for all other Blueprints in the project. This parent/child set up has many advantages and is key when working on large projects. The class demonstrates the concepts and techniques by walking through the complete process of creating a modular light switch.

By the end of this class, you should be able to:

- Set up a project for scalability to your target platform
- Create a parent Blueprint with specific properties that can be inherited and used in child Blueprints
- Set up a Blueprint Interface system to send/receive information and function calls between Blueprints
- Use Action and Axis mappings to allow for device specific controls
- Possess and control pawn Actors with a Player Controller
- Utilize the Line Trace functions for general purposes
- Create a Blueprint communication system through multiple Blueprint Interfaces

Prerequisites:

102.1 Introduction to Blueprints
102.2 Introduction to Creating User Interfaces with UMG and Blueprint

202.2 Blueprint Project - Your First Mobile App with Blueprint and UMG

In this class, you will learn how to use Unreal Motion Graphics (UMG) to create a wide range of interactive and reactive UI elements. You will also be shown how to communicate with UMG from Blueprints.

At the end of this class, participants will be able to:

- Create a new mobile project with UMG
- Work with media player to stream in an audio file
- Create UI with a widget Blueprint
- Create a play button used to play and pause media
- Import, adjust, and apply images for the UI
- Set up image selection to change background image when a button is pressed
- Animate buttons using the timeline in UMG
- Utilize the packaging features in Unreal Engine to build projects for target platforms

Prerequisites:

102.1 Introduction to Blueprints
102.2 Introduction to Creating User Interfaces with UMG and Blueprint

202.3 Blueprint - Introduction to Creating Custom Tools

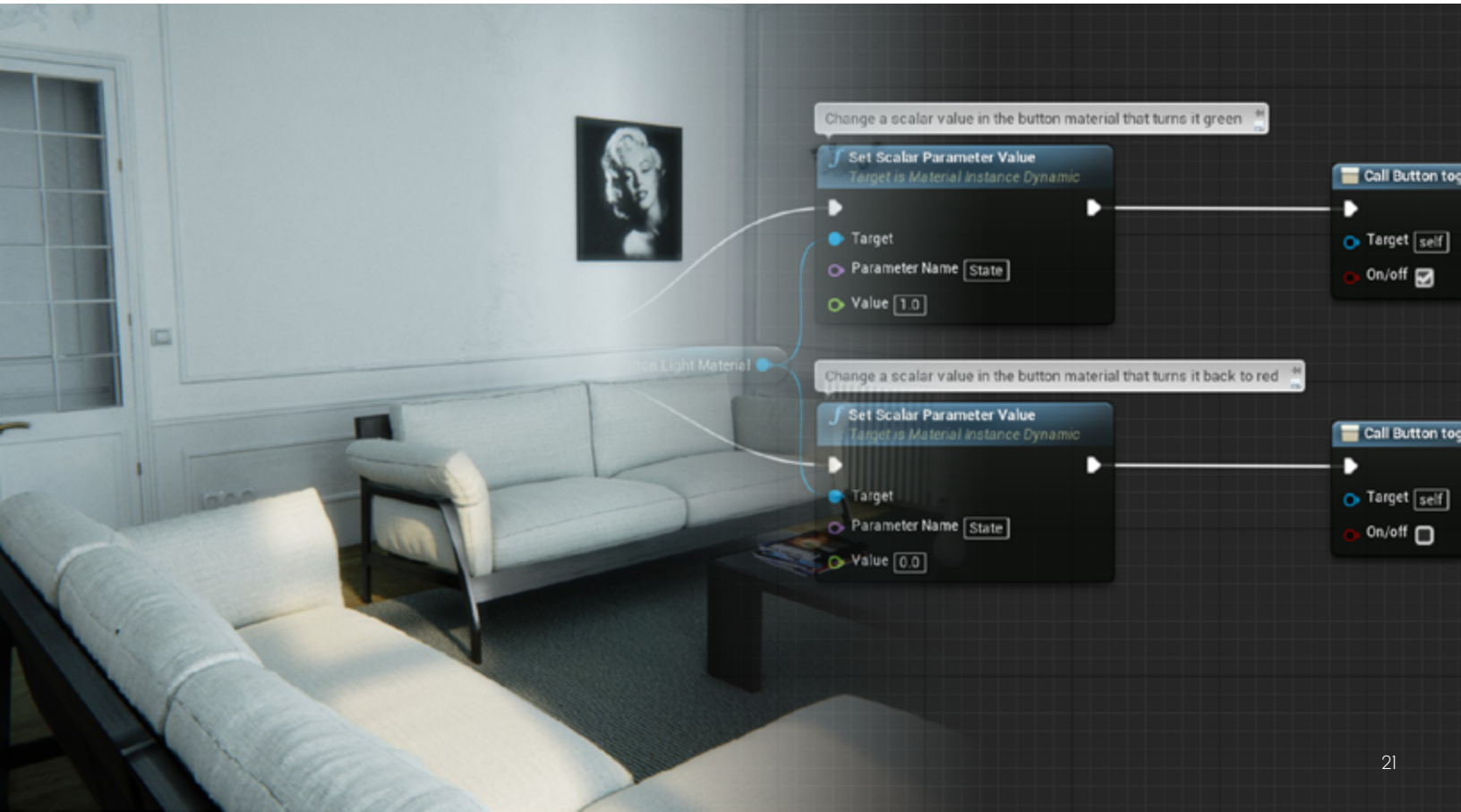
In this intermediate class, you will learn how to use Blueprint to create production-ready tools. Make your pipeline easier by adding your own tools to the Editor.

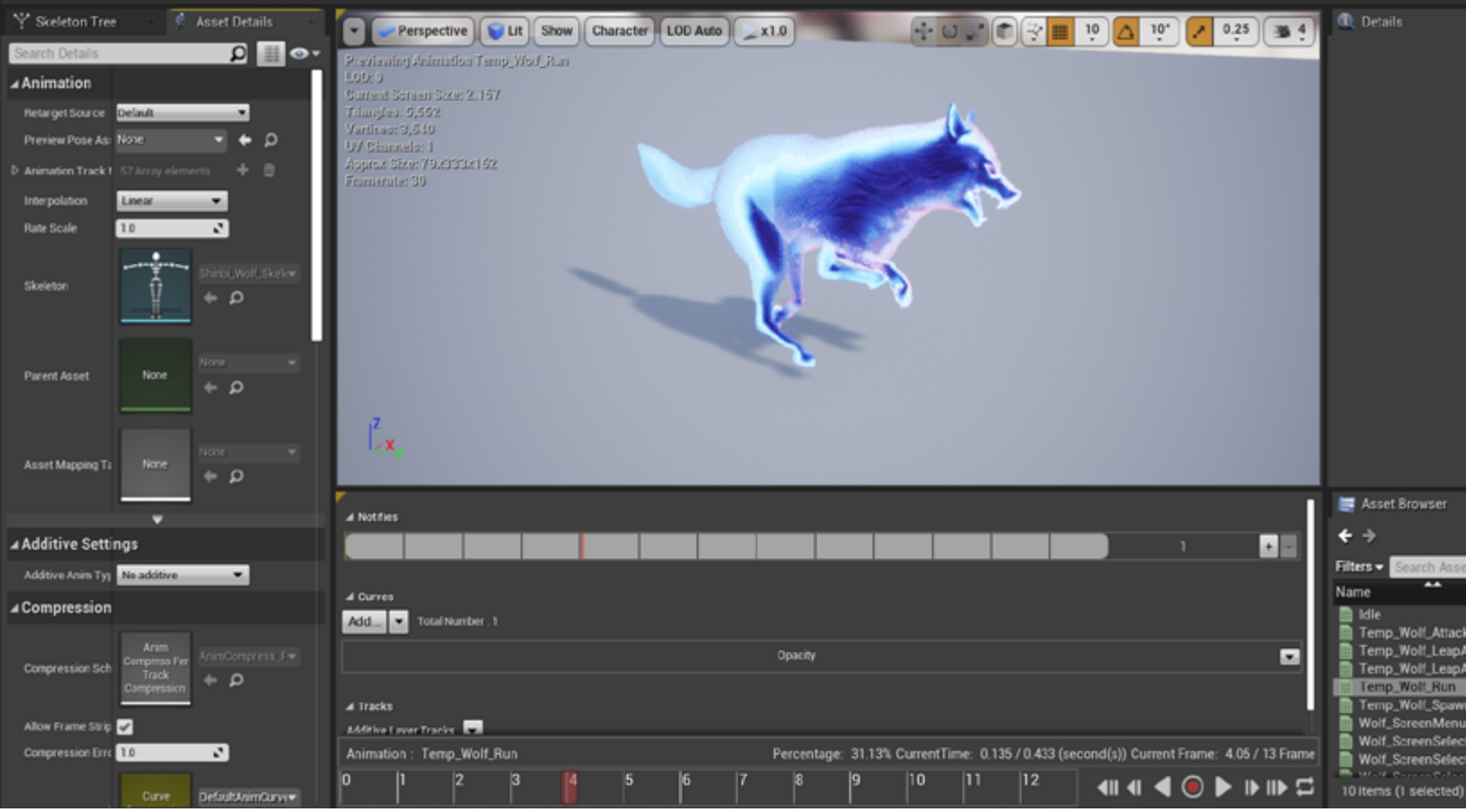
At the end of this class, participants will be able to:

- Utilize construction scripts to build simple tools to extend the Editor
- Create a tool that takes a Material's output and bakes it into a static texture
- Create a Settings Manager using an Editor Utility Widget to make it easier to enable and disable properties

Prerequisites:

202.1 Blueprint Set Up for Scalability: Interface System and Parent/Child Classes





Animation

107.1 Animation - Importing and Sub Editors

In this class, you will learn the basics of using animation for creating real-time and linear media in Unreal Engine. Using the Third Person Template, you'll import an animation and then get an overview of the animation sub-editors. You'll import a character and attach an object to the socket.

At the end of the class, you will be able to:

- Identify how the different sub-editors interact to form a single animated asset
- Import FBX animations and Skeletal Meshes for new or existing Skeletons
- Connect different animation assets (Skeleton, Skeletal Mesh, Animation, and Animation Blueprint)
- Attach Static Meshes to a Skeleton with sockets
- Manually adjust animations using Additive tracks

Prerequisites:

100.1 Introduction to Unreal Engine
102.1 Introduction to Blueprints

107.2 Animation - Retargeting and Reusing Animations

Learning to reuse and retarget animations with Unreal Engine will save you time and effort when working with many different meshes and Skeletons. Diverse background crowds can then be created and driven by combining this with the AI navigation system.

At the end of this class, participants will be able to:

- Apply different animations to different Skeletons
- Utilize retargeting to reassign meshes onto different Skeletons
- Use basic AI to create randomized crowd animation
- Combine animations into one using composites

Prerequisites:

107.1 Animation - Importing and Sub Editors

107.3 Animation - Introduction to Runtime Animation for Games

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At the end of this class, you will be able to:

- Explain the relationship between the Animation Blueprint's Event Graph and the Animation Graph
- Drive your animation with real-time game data using the Event Graph
- Use Blend Spaces to cleanly shift from one animation to another using input data

Prerequisites:

107.1 Animation - Importing and Sub Editors

207.1 Animation - Advanced Importing & Live Link

In this class, you will learn methods of bringing in animation and Skeletal Mesh data beyond basic importing. This class focuses on geometry cache importing and real-time animation previewing through Live Link. We will also touch on topics such as Blender's specific requirements and external tools.

At the end of this, class participants will be able to:

- Import, export, and play an Alembic animation
- Use the Live Link Plugin to connect Maya and Unreal Engine
- Import assets from Blender
- Find external tools that assist the Unreal Engine import pipeline

Prerequisites:

107.1 Animation - Importing and Sub Editors
105.2 Sequencer - Introduction

207.2 Animation - Blending Controls

In this class, you will learn intermediate techniques for blending animations in Unreal Engine. The class introduces Unreal Engine's Animation Blueprint concepts for use in real-time applications, simulations, and games. This also includes blending animations with physics and Collision assets in the level.

At the end of this class, participants will be able to:

- Control and blend skeletal bones via Animation Blueprint
- Blend animations and physics reactions in real time with Animation Blueprints
- Utilize a variety of blending functions available in Animation Blueprints

Prerequisites:

107.1 Animation - Importing and Sub Editors

207.3 Animation - Control Rig

In this class, you'll rig a Skeletal Mesh using Control Rig and then animate it in Sequencer. We'll build off of what was learned in previous Sequencer and Animation courses to create entirely new animations using only tools within Unreal Engine.

At the end of this class, participants will be able to:

- Build IK joint, Look At, and Transform rigs using Control Rig
- Animate rigged Skeletal meshes to create animations in Sequencer
- Create new animation assets using Control Rig and Sequencer that can then be used in an Animation Blueprint

Prerequisites:

107.1 Animation - Importing and Sub Editors
105.2 Sequencer - Introduction