

# Master's Degree

## 3D Animation and Virtual Reality



## Master's Degree 3D Animation and Virtual Reality

- » Modality: online
- » Duration: 12 months
- » Certificate: TECH Global University
- » Credits: 60 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/videogames/master-degree/master-3d-animation-virtual-reality](http://www.techtute.com/us/videogames/master-degree/master-3d-animation-virtual-reality)

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# 01 Presentation

Virtual reality is evolving by exponentially and increasingly occupies more and more fields, from video games and entertainment to robotic engineering, architecture or education, to name a few. The future of this technology is promising, with increasingly sophisticated and affordable devices for a wider audience. In this situation, people with adequate skills in 3D design, operation and programming for virtual environments will have a very strong competitive advantage in a rapidly expanding market. To respond to this new employment demand, TECH has developed this 100% online program, which will provide students with all the most innovative tools and methodologies in the field of virtual reality.



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*Virtual reality is already the present of today's entertainment and the tomorrow of many other fields. Be ahead of the rest and enroll in this Master's Degree to become a true expert in virtual reality video games"*

Virtual reality is the dream of many artists and engineers to create an immersive experience, where the viewer can see and even feel virtual environments in a completely realistic way. Thanks to today's technological advances, this dream is possible and virtual reality is more in fashion than ever, even with applications in the fields of education and science.

Therefore, the virtual reality market is in full expansion, requiring more and more professionals with specific qualifications in this field. The ideal candidate for any position related to virtual reality, especially if it involves video games, should have skills in computer graphics and 3D modeling, as well as knowledge of the main graphics engines such as Unreal Engine or Unity 3D.

For this reason, TECH's Master's Degree in 3D Animation and Virtual Reality contains everything expected and required of professionals who want to specialize their career towards the creation and virtualization of realistic or fantasy environments. Thanks to this program, students will learn how to create 3D models, how to animate them and how to take them to virtual reality, as well as a variety of other fields of knowledge that will help them to be an indispensable professional for every VR graphic studio.

A program that, in addition, allows students to be flexible without fixed schedules or compulsory attendance at physical centers, as its teaching is 100% online. This way, students will have the freedom to distribute the educational content according to their own personal constraints, because all the material can be downloaded from any device with internet access.

This **Master's Degree in 3D Animation and Virtual Reality** contains the most complete and up-to-date program on the market. Its most notable features are:

- ◆ The development of practical cases presented by Virtual Reality experts
- ◆ The graphic, schematic, and practical contents with which they are created, provide practical information on the disciplines that are essential for professional practice
- ◆ Practical exercises where self-assessment can be used to improve learning
- ◆ Special emphasis on 3D modeling and animation in virtual environments
- ◆ Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- ◆ Content that is accessible from any fixed or portable device with an Internet connection



*Valve, Microsoft or Ubisoft are some of the companies that are investing the most in virtual reality. Join their most ambitious projects with this 100% online program"*

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*Virtual reality is the future of 3D animation and video games. Don't get left behind and enroll now in this Master's Degree to learn about the latest advances in the sector”*

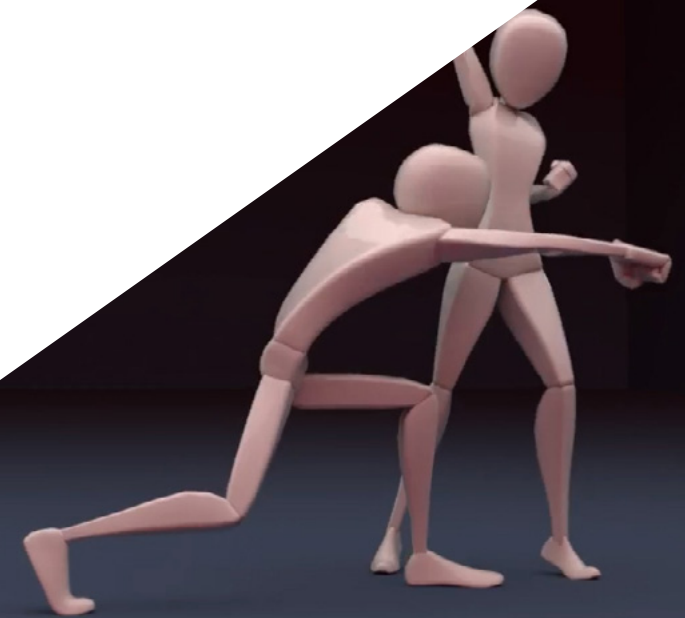
The program's teaching staff includes professionals from sector who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced experts.

*Thousands of players and streamers have competed in Beat Saber. Can you imagine being the designer of the next virtual reality bestseller? With this Master's Degree, you can.*

*If you want to create experiences that will live on in the players' memories, this Master's Degree will give you the tools to do just that.*



# 02

# Objectives

This program in 3D Animation and Virtual Reality will enable students to skillfully use the best 3D design and modeling tools. The expertise provided by a team of experts in this environment will allow students to boost their careers towards today's best video game companies, having a highly versatile and in-demand set of knowledge for the most complex projects. The following objectives established by TECH ensure that students will graduate from the program with all the necessary skills and abilities.





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*TECH's goal is the same as yours: to get you the best professional opportunities with the most advanced tools and knowledge”*



## General Objectives

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- ◆ Provide specialized knowledge about the 3D industry
- ◆ Use 3D Max software to generate different contents
- ◆ Propose a series of best practices and organized and professional work.
- ◆ Generate specialized knowledge in Virtual Reality
- ◆ Determine assets , characters and Virtual Reality integration
- ◆ Analyze the importance of audio in video games
- ◆ Use the ZBrush program for 3D sculpting
- ◆ Develop organic modeling and retopology techniques
- ◆ Finalize 3D characters for portfolios
- ◆ Animate biped and quadruped 3D characters
- ◆ Discover 3D Rigging
- ◆ Analyze the importance of the animator's body movement in order to have animation references
- ◆ Provide specialized technical knowledge to develop prototypes quickly and efficiently
- ◆ Exploit the potential of Unity and the different technologies associated with video game development
- ◆ Develop advanced programming techniques and best practices
- ◆ Delve into the development of elements, visual components and systems related to the 3D environment





- ◆ Generate particle systems and Shaders to enhance the artistic finish of the game
- ◆ Develop immersive environments whose visual components can be optimally managed and executed
- ◆ Develop advanced characters for 3D video games
- ◆ Use animation systems and other resources as libraries in professional projects
- ◆ Prepare projects for proper export
- ◆ Apply acquired knowledge to the VR environment
- ◆ Adapting the behavior of video game components to VR
- ◆ Integrate the designed and implemented content into a complete playable project
- ◆ Elaborate the sound identity of a 3D video game project
- ◆ Design the appropriate type of audio for the project such as vocals, soundtrack or special sound effects
- ◆ Estimate the audio creation effort to work within an appropriate production plan and timing
- ◆ Develop the Scrum and Agile methodology applied to video games to manage projects
- ◆ Establish a system for calculating effort, in the form of estimates, based on hours
- ◆ Generate material to present projects to investors



## Specific Objectives

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### Module 1. The 3D Industry

- ◆ Examine the current state of the 3D industry, as well as its evolution over the last few years
- ◆ Generate specialized knowledge about the software commonly used within the industry to generate professional 3D content
- ◆ Determine the steps to develop this type of content through a pipeline adapted to the video game industry
- ◆ Analyze the most advanced 3D styles, as well as their differences, advantages and disadvantages for subsequent generation
- ◆ Integrate content developed in both the digital world (video games, VR, etc.) and the real world (AR, MR/XR)
- ◆ Establish the key points that differentiate a 3D project in the video game industry, cinema, TV series or the world of advertising
- ◆ Generate professional quality 3D assets using 3D Max and learn how to use the tool
- ◆ Maintain an organized workspace and maximize the efficiency of time spent generating 3D content

### Module 2. Art and 3D in the Video Game Industry

- ◆ Examine 3D mesh creation and image editing software
- ◆ Analyze the possible problems and resolution in 3D VR projects
- ◆ Be able to define the aesthetic line for the generation of the artistic style of a video game
- ◆ Determine the reference sites for the search for aesthetics
- ◆ Evaluate the time constraints for the development of an artistic style
- ◆ Produce Assets and integrate them into a scenario
- ◆ Create characters and integrate them into a scenario
- ◆ Value the importance of audio and sounds of a video game

### Module 3. Advanced 3D

- ◆ Master the most advanced 3D modeling techniques
- ◆ Develop the necessary knowledge for 3D texturing
- ◆ Export objects for 3D and Unreal Engine software
- ◆ Specialize students in digital sculpture
- ◆ Analyze the different digital sculpting techniques
- ◆ Research character retopology
- ◆ Examine how to pose a character to loosen the 3D model
- ◆ Refine our work with advanced high-polygon modeling techniques

#### **Module 4. 3D Animation**

- ◆ Develop specialized knowledge in the use of 3D animation software
- ◆ Determine the similarities and differences between a biped and a quadruped
- ◆ Develop several animation cycles
- ◆ Internalizing Lip-Sync, Rig facial
- ◆ Analyze the differences between animation made for film and for video games
- ◆ Develop customized skeletons
- ◆ Master camera and shot composition

#### **Module 5. Proficiency in Unity 3D and artificial intelligence**

- ◆ Analyze decision history from the technological point of view of video game evolution
- ◆ Plan a sustainable and flexible technological development
- ◆ Generate specialized knowledge on Scripting and use of third party Plugins in the development of our content
- ◆ Implement physics and animation systems
- ◆ Master rapid prototyping and basic shape techniques for structuring scenes and study the proportions of Assets
- ◆ Delve into the specific techniques of advanced videogame programming
- ◆ Apply the knowledge acquired to develop video games with different technologies such as AR, AI, etc

#### **Module 6. 2D and 3D Video Game Development**

- ◆ Learn how to use raster graphic resources to integrate into 3D video games
- ◆ Implement interfaces and menus for 3D video games, easy to apply to VR environments
- ◆ Create versatile animation systems for professional video games
- ◆ Use Shaders and materials to give a professional finish
- ◆ Create and configure particle systems
- ◆ Use optimized lighting techniques to reduce the impact on game engine performance
- ◆ Generate professional quality VFX
- ◆ Know the different components to manage the different types of audio, in a 3D video game

#### **Module 7. Programming, Mechanics Generation and Video Game Prototyping Techniques**

- ◆ Work with Low-poly and High-poly models in professional developments under Unity 3D environment
- ◆ Implement advanced functionalities and behaviors in characters for video games
- ◆ Correctly import character animations into the working environment
- ◆ Control Ragdoll systems y skeletal meshes
- ◆ Master the available resources such as Asset libraries and functionalities and import them into the project configured by students
- ◆ Discover the key points of teamwork for technical professionals involved in 3D programming and animation
- ◆ Configure the project to export it correctly and ensure that it works correctly

### Module 8. VR Immersive Game Development

- ◆ Determine the main differences between traditional video games and video games based on VR environments
- ◆ Modify interaction systems to adapt them to Virtual Reality
- ◆ Manage the physics engine to support player actions performed with VR devices
- ◆ Apply the development of UI elements to VR
- ◆ Integrate the developed 3D models into the VR scenario
- ◆ Configure avatars with the appropriate settings for a VR experience
- ◆ Optimize the VR project for its correct execution

### Module 9. Professional Audio for 3D VR Video Games

- ◆ Analyze the different types of audio styles in video games and industry trends
- ◆ Examine methods for studying project documentation to build audio
- ◆ Study the main references in order to extract the key points of the sound identity
- ◆ Design the complete 3D video game sound identity
- ◆ Determine the key aspects of creating the video game soundtrack and sound effects for the project
- ◆ Develop the key aspects of working with voice actors and actresses and recording game voices
- ◆ Compile video game audio export methods and formats using current technologies
- ◆ Generate complete sound libraries to be marketed as professional asset packs for development studios





### Module 10. Video Game Production and Financing

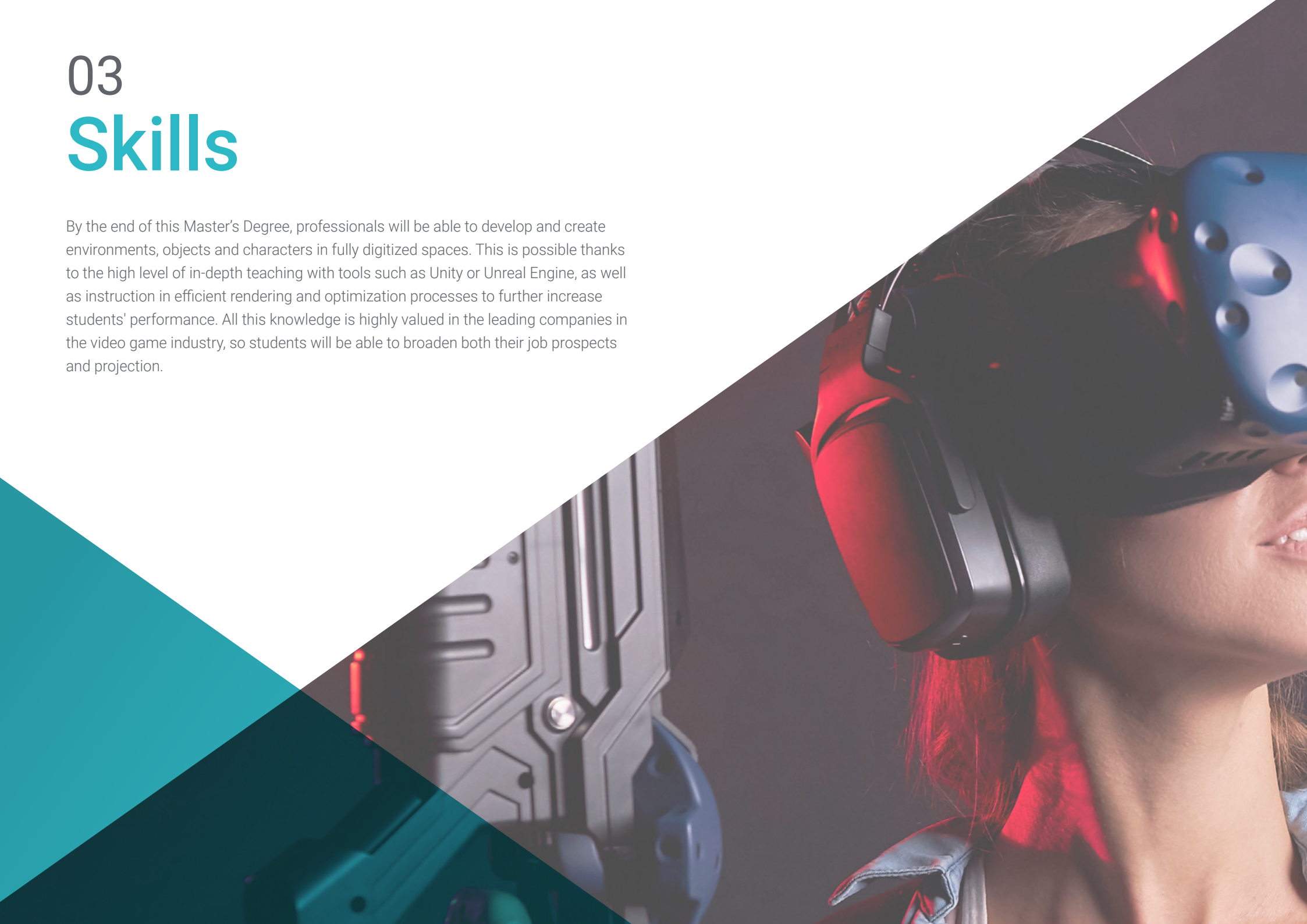
- ◆ Determine the differences between production methodologies prior to Scrum and their evolution to the present day
- ◆ Apply Agile thinking to any development without losing project management
- ◆ Develop a sustainable framework for the entire team
- ◆ Anticipating PR needs Production HH and prepare a calculation of basic personnel costs
- ◆ Conduct prior analysis to obtain key information for communication about the most important values of our project
- ◆ Support the project's sales and financing arguments with numbers that demonstrate the project's potential solvency
- ◆ Determine the necessary steps to approach Publishers and investors

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*Thanks to this TECH program, you will be closer to your own goal of growing professionally in the field of video games and virtual reality”*

# 03 Skills

By the end of this Master's Degree, professionals will be able to develop and create environments, objects and characters in fully digitized spaces. This is possible thanks to the high level of in-depth teaching with tools such as Unity or Unreal Engine, as well as instruction in efficient rendering and optimization processes to further increase students' performance. All this knowledge is highly valued in the leading companies in the video game industry, so students will be able to broaden both their job prospects and projection.







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*Your position in the labor market will improve thanks to all the skills you will learn in this Master's Degree"*



## General Skills

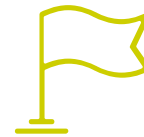
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- ◆ Obtain an in-depth knowledge of the 3D industry applied to video games
- ◆ Develop an advanced knowledge of the creation process of specialized 3D animation projects
- ◆ Generate Assets and 3D elements
- ◆ Create 3D animated elements
- ◆ Integrate Unity 3D generated content
- ◆ Apply a detailed pipeline tailored to today's industry needs
- ◆ Discover different styles of 3D art and their main advantages and disadvantages
- ◆ Know what the key factors are when it comes to applying the knowledge acquired to the video game, film and series industries and the world of advertising

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*Don't hesitate any longer and give that extra quality to your resume with advanced knowledge in virtual reality and 3D design that you will acquire in this program"*





## Specific Skills

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- ◆ Master 3D Max
- ◆ Organize the workspace in a professional manner and apply a set of best practices, based on the teachers' experience in real companies
- ◆ Create interactive 3D scenarios, where you can integrate the material created throughout the program
- ◆ Create animated 3D characters
- ◆ Delve into advanced texturing techniques, use of different types of brushes, etc.
- ◆ Specialize in Digital Sculpting with ZBrush
- ◆ Master the creation of cinematics
- ◆ Analyze the operation to create Facial Rigs, Lip Sync, etc.
- ◆ Use Unity 3D and Unreal Engine to test content created within a fully interactive game environment
- ◆ Generate prototypes of both 2D and 3D video games with mechanics and physics
- ◆ Develop prototypes for augmented reality and mobile devices
- ◆ Program artificial intelligence in an efficient way
- ◆ Apply Ragdoll simulation technology to characters
- ◆ Organize projects using an effective version control system
- ◆ Become familiar with the production process of these characteristics, as well as with the main notions of management
- ◆ Determine the reasons why agile methodologies are used in companies and professional development teams

# 04

# Course Management

The faculty in charge of this Master's Degree in 3D Animation and Virtual Reality has extensive experience in 3D design for all types of virtual projects, so students are assured of receiving the best possible education in this field. Their experience with large companies in the technological field will help students to develop their full potential with practical cases and innovative methodology.





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*You will succeed in the field of virtual reality by designing games that engage gamers of all types and ages”*

## Management



### Mr. Ortega Ordóñez, Juan Pablo

- ♦ Director of Engineering and Gamification Design for the Intervenía Group
- ♦ Professor at ESNE of Video Game Design, Level Design, Video Game Production, Middleware, Creative Media Industries, etc.
- ♦ Advisor in the foundation of companies such as Avatar Games or Interactive Selection
- ♦ Author of the book Video Game Design
- ♦ Member of the Advisory Board of Nima World

## Professors

### Mr. Núñez Martín, Daniel

- ◆ Producer at Cateffects S.L
- ◆ Music producer specialized in the composition and design of original music for audiovisual media and video games
- ◆ Audio designer and music composer at Risin' Goat S.L
- ◆ Sound technician for audiovisual dubbing at SOUNDUB S.A
- ◆ Content creator for the Talentum Master in Video Game Creation at Telefónica Educación Digital
- ◆ Higher Technician in Professional Sound Training from the Francisco de Vitoria University
- ◆ Intermediate Degree of Official Music Education by the Conservatorio Manuel de Falla, specializing in Piano and Saxophone

### Mr. Pradana Sánchez, Noel

- ◆ Specialist in Rigging and 3D Animation for videogames
- ◆ 3D Graphic Artist at Dog Lab Studios
- ◆ Producer at Imagine Games leading the video game development team
- ◆ Graphic artist at Wildbit Studios with 2D and 3D works
- ◆ Teaching experience in ESNE and in the CFGS in 3D Animation: games and educational environments
- ◆ Master's Degree in Video Game Design and Development from ESNE University
- ◆ Master's Degree in Teacher Training from Rey Juan Carlos University
- ◆ Specialist in Rigging and 3D Animation Voxel School

### Mr. Martínez Alonso, Sergio

- ◆ Senior Unity Developer at NanoReality Games Ltd
- ◆ Lead Programmer and Game Designer at NoobO Games
- ◆ Teacher in several educational centers such as iFP, Implika or Rockbotic
- ◆ Programmer at Stage Clear Studios
- ◆ Professor at the University School of Design, Innovation and Technology
- ◆ Degree in Computer Engineering from the University of Murcia
- ◆ Master's Degree in Video Game Design and Development from the University School of Design, Innovation and Technology

### Mr. Ferrer Mas, Miquel

- ◆ Senior Unity Developer at Quantic Brains
- ◆ Lead programmer at Big Bang Box
- ◆ Co-founder and of video game programmer at Carbonbyte
- ◆ Audiovisual Programmer at Unkasoft Advergaming
- ◆ Video Game Programmer at Enne
- ◆ Design Director at Bioalma
- ◆ Superior Technician in Computer Science at Na Camel-la
- ◆ Master's Degree in Video Game Programming by CICE
- ◆ Introduction to Deep Learning with PyTorch course by Udacity

# 05

## Structure and Content

This Master's Degree is structured into 10 content modules covering all fields related to 3D animation and computing in virtual reality environments, with topics and subtopics dedicated to the main tools, working methods, digital resources and forms of team organization. With all this, students will obtain a complete understanding of what is involved in the creation and subsequent implementation of virtual reality projects adapted to video games, through a 100% online program.







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*Conducted by experts in the field, this syllabus guarantees you will learn everything about 3D animation in virtual reality environments”*

## Module 1. The 3D Industry

- 1.1. 3D Animation and Video Game Industry
  - 1.1.1. 3D Animation
  - 1.1.2. 3D Animation and Video Game Industry
  - 1.1.3. 3D Animation Future
- 1.2. 3D in Video Games
  - 1.2.1. Video Games Limitations
  - 1.2.2. 3D Video Game Development Difficulties
  - 1.2.3. Solutions to Video Game Development Difficulties
- 1.3. 3D Software for Video Games
  - 1.3.1. Maya. Pros and Cons
  - 1.3.2. 3Ds Max. Pros and Cons
  - 1.3.3. Blender. Pros and Cons
- 1.4. Pipeline in 3D Asset Generation for Video Games
  - 1.4.1. Idea and assembly from a Model Sheet
  - 1.4.2. Modeling with Low Geometry and High Detailing
  - 1.4.3. Projection of Textured Details
- 1.5. Key Artistic 3D Styles for Video Games
  - 1.5.1. Cartoon Style
  - 1.5.2. Realistic Style
  - 1.5.3. Cel Shading
  - 1.5.4. Motion Capture
- 1.6. 3D Integration
  - 1.6.1. 3D Digital World Integration
  - 1.6.2. 3D Digital World Integration
  - 1.6.3. Real-World Integration (AR, MR/XR)
- 1.7. Key 3D Factors for Different Industries
  - 1.7.1. 3D in Film and Series
  - 1.7.2. 3D in Video Games
  - 1.7.3. 3D in Marketing
- 1.8. Render: Real-Time Rendering and Pre-Rendering
  - 1.8.1. Lighting
  - 1.8.2. Shadow Definition
  - 1.8.3. Quality vs Speed
- 1.9. 3D Asset Generation in 3D Max
  - 1.9.1. 3D Max Software
  - 1.9.2. Interface, Menus, Toolbars
  - 1.9.3. Controls
  - 1.9.4. Scene
  - 1.9.5. Viewports
  - 1.9.6. Basic Shapes
  - 1.9.7. Object Generation, Modification and Transformation
  - 1.9.8. 3D Scene Creation
  - 1.9.9. 3D Professional Asset Modeling for Video Games
  - 1.9.10. Material Editors
    - 1.9.10.1. Creating and Editing Materials
    - 1.9.10.2. Applying Light to Materials
    - 1.9.10.3. UVW Map Modifier. Mapping Coordinates
    - 1.9.10.4. Texture Creation
- 1.10. Workspace Organization and Best Practices
  - 1.10.1. Creation of a Project
  - 1.10.2. Folder Structure
  - 1.10.3. Custom Functionality

## Module 2. Art and 3D in the Video Game Industry

- 2.1. 3D VR Projects
  - 2.1.1. 3D Mesh Creation Software
  - 2.1.2. Image Editing Software
  - 2.1.3. Virtual reality
- 2.2. Typical Problems, Solutions and Project Needs
  - 2.2.1. Project Needs
  - 2.2.2. Possible Problems
  - 2.2.3. Solutions
- 2.3. Esthetic Line Study for the Artistic Style Generation in Video Games: From Game Design to 3D Art Generation
  - 2.3.1. Choice of Video Game Recipient. Who Do We Want to Reach?
  - 2.3.2. Developer's Artistic Possibilities
  - 2.3.3. Final Definition of the Aesthetic Line
- 2.4. Aesthetic Benchmarking and Competitor Analysis
  - 2.4.1. Pinterest and Similar Sites
  - 2.4.2. Creation of a Model Sheet
  - 2.4.3. Competitor Search
- 2.5. Bible Creation and Briefing
  - 2.5.1. Bible Creation
  - 2.5.2. Bible Development
  - 2.5.3. Briefing Development
- 2.6. Scenarios and Assets
  - 2.6.1. Production Asset Planning at Production Levels
  - 2.6.2. Scenario Design
  - 2.6.3. Asset Design
- 2.7. Asset Integration in Levels and Tests
  - 2.7.1. Integration Process at All Levels
  - 2.7.2. Texture
  - 2.7.3. Final Touches

- 2.8. Characters
  - 2.8.1. Character Production Planning
  - 2.8.2. Character Design
  - 2.8.3. Character Asset Design
- 2.9. Character Integration in Scenarios and Tests
  - 2.9.1. Character Integration Process in Levels
  - 2.9.2. Project Needs
  - 2.9.3. Animations
- 2.10. 3D Video Game Audio
  - 2.10.1. Project Dossier Interpretation for Sound Identity Generation of Video Games
  - 2.10.2. Composition and Production Processes
  - 2.10.3. Soundtrack Design
  - 2.10.4. Sound Effect Design
  - 2.10.5. Voice Design

## Module 3. Advanced 3D

- 3.1. Advanced 3D Modeling Techniques
  - 3.1.1. Interface Configuration
  - 3.1.2. Modeling Observation
  - 3.1.3. Modeling in High
  - 3.1.4. Organic Modeling for Videogames
  - 3.1.5. Advanced 3D Object Mapping
- 3.2. Advanced 3D Texturing
  - 3.2.1. Substance Painter Interfaces
  - 3.2.2. Materials, Alphas and Brush Use
  - 3.2.3. Particle Use
- 3.3. 3D Software and Unreal Engine Export
  - 3.3.1. Unreal Engine Integration in Designs
  - 3.3.2. 3D Model Integration
  - 3.3.3. Unreal Engine Texture Application

- 3.4. Digital Sculpting
  - 3.4.1. DigitalSculpting with ZBrush
  - 3.4.2. First Steps in ZBrush
  - 3.4.3. Interface, Menus and Navigation
  - 3.4.4. Reference Images
  - 3.4.5. Full 3D Modeling of Objects in ZBrush
  - 3.4.6. Base Mesh Use
  - 3.4.7. Part Modeling
  - 3.4.8. 3D Model Export in ZBrush
- 3.5. Polypaint Use
  - 3.5.1. Advanced Brushes
  - 3.5.2. Texture.
  - 3.5.3. Default Materials
- 3.6. Retopology
  - 3.6.1. Rheopology Use in the Video Game Industry
  - 3.6.2. Low-Poly Mesh Creation
  - 3.6.3. Software Use for Rhetopology
- 3.7. 3D Model Positions
  - 3.7.1. Reference Image Viewers
  - 3.7.2. Transpose Use
  - 3.7.3. Transpose Use for Models Composed of Different Pieces
- 3.8. 3D Model Export
  - 3.8.1. 3D Model Export
  - 3.8.2. Texture Generation for Exportation
  - 3.8.3. 3D Model Configuration with the Different Materials and Textures
  - 3.8.4. Preview of the 3D Model

- 3.9. Advanced Working Techniques
  - 3.9.1. 3D Modeling Workflow
  - 3.9.2. 3D Modeling Work Process Organization
  - 3.9.3. Production Effort Estimates
- 3.10. Model Finalization and Export for Other Programs
  - 3.10.1. Workflow for Model Finalization
  - 3.10.2. ZPlugin Exportation
  - 3.10.3. Possible Files. Advantages and Disadvantages

## Module 4. 3D Animation

- 4.1. Software Operation
  - 4.1.1. Information Management and Work Methodology
  - 4.1.2. Animation
  - 4.1.3. Timing and Weight
  - 4.1.4. Animation With Basic Objects
  - 4.1.5. Direct and Inverse Cinematics
  - 4.1.6. Inverse Kinematics
  - 4.1.7. Kinematic Chain
- 4.2. Anatomy. Biped Vs. Quadruped
  - 4.2.1. Biped
  - 4.2.2. Quadruped
  - 4.2.3. Walking Cycle
  - 4.2.4. Running Cycle
- 4.3. Facial Rig and Morpher
  - 4.3.1. Facial Language. Lip-Sync, Eyes and Focal Points
  - 4.3.2. Sequence Editing
  - 4.3.3. Phonetics. Importance

- 4.4. Applied Animation
  - 4.4.1. 3D Animation for Film and Television
  - 4.4.2. Animation for Video Games
  - 4.4.3. Animation for Other Applications
- 4.5. Motion Capture with Kinect
  - 4.5.1. Motion Capture for Animation
  - 4.5.2. Sequence of Movements
  - 4.5.3. Blender Integration
- 4.6. Skeleton, Skinning and Setup
  - 4.6.1. Interaction Between Skeleton and Geometry
  - 4.6.2. Mesh Interpolation
  - 4.6.3. Animation Weights
- 4.7. Acting
  - 4.7.1. Body Language
  - 4.7.2. Poses
  - 4.7.3. Sequence Editing
- 4.8. Cameras and Plans
  - 4.8.1. The Camera and the Environment
  - 4.8.2. Composition of the Shot and the Characters
  - 4.8.3. Finishes
- 4.9. Visual Special Effects
  - 4.9.1. Visual Effects and Animation
  - 4.9.2. Types of Optical Effects
  - 4.9.3. 3D VFX L
- 4.10. The Animator as an Actor
  - 4.10.1. Expressions
  - 4.10.2. Actors' References
  - 4.10.3. From Camera to Program

## Module 5. Unity 3D and Artificial Intelligence proficiency

- 5.1. Video Games 3D Unity
  - 5.1.1. Video Games
  - 5.1.2. Video Games. Hits and Misses
  - 5.1.3. Video Game Applications in Other Areas and Industries
- 5.2. Video Game Development. 3D Unity
  - 5.2.1. Production Plan and Development Phases
  - 5.2.2. Development Methodology
  - 5.2.3. Patches and Additional Content
- 5.3. 3D Unity
  - 5.3.1. Unity 3D. Applications
  - 5.3.2. Scripting in Unity 3D
  - 5.3.3. Asset Store and Third-Partyplugins
- 5.4. Physics, Inputs
  - 5.4.1. Input System
  - 5.4.2. Physics in Unity 3D
  - 5.4.3. Animation and Animator
- 5.5. Unity Prototyping
  - 5.5.1. Blocking and Colliders
  - 5.5.2. Pre-Fabs
  - 5.5.3. Scriptable Objects
- 5.6. Specific Programming Techniques
  - 5.6.1. Singleton Model
  - 5.6.2. Loading of Resources in the Execution of Windows Games
  - 5.6.3. Performance and Profiler

- 5.7. Video Games for Mobile Devices
  - 5.7.1. Games for Android Devices
  - 5.7.2. Games for IOS Devices
  - 5.7.3. Multiplatform Developments
- 5.8. Augmented Reality
  - 5.8.1. Types of Augmented Reality games
  - 5.8.2. ARkit and ARcore
  - 5.8.3. Vuforia Development
- 5.9. Artificial Intelligence Programming
  - 5.9.1. Artificial Intelligence Algorithms
  - 5.9.2. Finite State Machines
  - 5.9.3. Neural Networks
- 5.10. Distribution and Marketing
  - 5.10.1. The art of Publishing and Promoting a Video Game
  - 5.10.2. The Responsible for Success
  - 5.10.3. Strategies

## Module 6. 2D and 3D Video Game Development

- 6.1. Raster Graphic Resources
  - 6.1.1. *Sprites*
  - 6.1.2. Atlas
  - 6.1.3. Texture
- 6.2. Interface and Menu Development
  - 6.2.1. Unity GUI
  - 6.2.2. Unity UI
  - 6.2.3. UI Toolkit
- 6.3. Animation System
  - 6.3.1. Animation Curves and Keys
  - 6.3.2. Applied Animation Events
  - 6.3.3. Modifiers

- 6.4. Materials and Shaders
  - 6.4.1. Material Components
  - 6.4.2. RenderPass Types
  - 6.4.3. Shaders
- 6.5. Particles
  - 6.5.1. Particle Systems
  - 6.5.2. Transmitters and Sub-Transmitters
  - 6.5.3. Scripting
  - 6.5.4. Lighting
- 6.6. Lighting Modes
  - 6.6.1. Light Baking
  - 6.6.2. Light Probes
- 6.7. Mecanim
  - 6.7.1. State Machines, SubState Machines and Transitions between Animations
  - 6.7.2. Blend Trees
  - 6.7.3. Animation Layers and IK
- 6.8. Cinematic Finish
  - 6.8.1. Timeline
  - 6.8.2. Post-Processing Effects
  - 6.8.3. Universal Render Pipeline and High-Definition Render Pipeline
- 6.9. Advanced VFX
  - 6.9.1. VFX Graph
  - 6.9.2. Shader Graph
  - 6.9.3. Pipeline Tools
- 6.10. Audio Components
  - 6.10.1. Audio Source and Audio Listener
  - 6.10.2. Audio Mixer
  - 6.10.3. Audio Spatializer

## Module 7. Programming, Mechanics Generation and Video Game Prototyping Techniques

- 7.1. Technical Process
  - 7.1.1. Low-Poly and High-Poly Models in Unity
  - 7.1.2. Material Settings
  - 7.1.3. High-Definition Render Pipeline
- 7.2. Character Design
  - 7.2.1. Movement
  - 7.2.2. Collider Design
  - 7.2.3. Creation and Behavior
- 7.3. Importing Skeletal Meshes into Unity
  - 7.3.1. Exporting Skeletal Meshes from 3D Software
  - 7.3.2. Skeletal Meshes in Unity
  - 7.3.3. Anchor Points for Accessories
- 7.4. Importing Animations
  - 7.4.1. Animation Preparation
  - 7.4.2. Importing Animations
  - 7.4.3. Animator and Transitions
- 7.5. Animation Editor
  - 7.5.1. Blend Spaces Creation
  - 7.5.2. Animation Montage Creation
  - 7.5.3. Editing Read-Only Animations
- 7.6. Ragdoll Creation and Simulation
  - 7.6.1. Ragdoll Configuration
  - 7.6.2. Ragdoll to Animation Graphics
  - 7.6.3. Ragdoll Simulation
- 7.7. Resources for Character Creation
  - 7.7.1. Libraries
  - 7.7.2. Importing and Exporting Library Materials
  - 7.7.3. Handling of Materials

- 7.8. Work Teams
  - 7.8.1. Hierarchy and Work Roles
  - 7.8.2. Version Control Systems
  - 7.8.3. Conflict Resolution
- 7.9. Requirements for Successful Development
  - 7.9.1. Production for Success
  - 7.9.2. Optimal Development
  - 7.9.3. Essential Requirements
- 7.10. Publication Packaging
  - 7.10.1. Player Settings
  - 7.10.2. Build
  - 7.10.3. Installer Creation

## Module 8. VR Immersive Game Development

- 8.1. Uniqueness of VR
  - 8.1.1. Traditional Video Games and VR. Differences
  - 8.1.2. Motion Sickness: Smoothness vs. Effects
  - 8.1.3. Unique VR Interactions
- 8.2. Interaction
  - 8.2.1. Events
  - 8.2.2. Physical Triggers
  - 8.2.3. Virtual World vs.. Real World
- 8.3. Immersive Locomotion
  - 8.3.1. Teletransportation
  - 8.3.2. Arm Swinging
  - 8.3.3. Forward Movement With and Without Facing
- 8.4. VR Physics
  - 8.4.1. Grabbable and Throwable Objects
  - 8.4.2. Weight and Mass in VR
  - 8.4.3. Gravity in VR

- 8.5. UI in VR
  - 8.5.1. Positioning and Curvature of UI Elements
  - 8.5.2. VR Menu Interaction Modes
  - 8.5.3. Best Practices for Comfortable Experiences
- 8.6. VR Animation
  - 8.6.1. Animated Model Integration in VR
  - 8.6.2. Animated Objects and Characters vs. Physical Objects
  - 8.6.3. Animated vs. Procedural Transitions
- 8.7. Avatars
  - 8.7.1. Avatar Representation from Your Own Eyes
  - 8.7.2. External Representation of Avatars
  - 8.7.3. Inverse Cinematic and Procedural Avatar Animation
- 8.8. Audio
  - 8.8.1. Configuring Audio Sources and Audio Listeners for VR
  - 8.8.2. Effects Available for More Immersive Experiences
  - 8.8.3. Audio Spatializer VR
- 8.9. VR and AR Project Optimization
  - 8.9.1. Occlusion Culling
  - 8.9.2. Static Batching
  - 8.9.3. Quality Settings and Render Pass Types
- 8.10. Practice: VR Escape Room
  - 8.10.1. Experience Design
  - 8.10.2. Scenario Layout
  - 8.10.3. Mechanic Development

## Module 9. Professional Audio for 3D VR Video Games

- 9.1. Professional 3D Video Games Audio
  - 9.1.1. Video Game Audio
  - 9.1.2. Audio Style Types in Current Video Games
  - 9.1.3. Spatial Audio Models
- 9.2. Preliminary Material Study
  - 9.2.1. Game Design Documentation Study
  - 9.2.2. Level Design Documentation Study
  - 9.2.3. Complexity and Typology Evaluation to Create Audio Projects
- 9.3. Sound Reference Studio
  - 9.3.1. Main References List by Similarity with the Project
  - 9.3.2. Auditory References from Other Media to Give Video Games' Identity
  - 9.3.3. Reference Study and Drawing of Conclusions
- 9.4. Sound Identity Design for Video Games
  - 9.4.1. Main Factors Influencing the Project
  - 9.4.2. Relevant Aspects in Audio Composition: Instrumentation, Tempo, etc.
  - 9.4.3. Voice Definition
- 9.5. Soundtrack Creation
  - 9.5.1. Environment and Audio Lists
  - 9.5.2. Definition of Motif, Themes and Instrumentation
  - 9.5.3. Composition and Audio Testing of Functional Prototypes
- 9.6. Sound Effect Creation (FX)
  - 9.6.1. Sound Effects: FX Types and Complete Lists According to Project Needs
  - 9.6.2. Definition of Motif, Themes and Creation
  - 9.6.3. Sound FX Evaluation and Functional Prototype Testing
- 9.7. Voice Creation
  - 9.7.1. Voice Types and Phrase Listing
  - 9.7.2. Search and Evaluation of Voice Actors and Actresses
  - 9.7.3. Recording Evaluation and Testing of Voices on Functional Prototypes



- 9.8. Audio Quality Evaluation
  - 9.8.1. Elaboration of Listening Sessions with the Development Team
  - 9.8.2. All Audio Integration into Working Prototypes
  - 9.8.3. Testing and Evaluation of the Results Obtained
- 9.9. Project Exporting, Formatting and Importing Audio
  - 9.9.1. Video Game Audio Formats and Compression
  - 9.9.2. Exporting Audio
  - 9.9.3. Importing Project Audio
- 9.10. Preparing Audio Libraries for Marketing
  - 9.10.1. Versatile Sound Library Design for Video Game Professionals
  - 9.10.2. Audio Selection by Type: Soundtrack, FX and Voices
  - 9.10.3. Audio Asset Library Marketing

## Module 10. Video Game Production and Financing

- 10.1. Video Game Production
  - 10.1.1. Cascading Methodologies
  - 10.1.2. Case Studies on Lack of Project Management and Work Plan
  - 10.1.3. Consequences of the Lack of a Production Department in the Video Game Industry
- 10.2. Development Teams
  - 10.2.1. Key Departments in Project Development
  - 10.2.2. Key Profiles in Micro-Management: Lead and Senior
  - 10.2.3. Problems of Lack of Experience in Junior Profiles
  - 10.2.4. Establishment of Training Plan for Low-Experience Profiles
- 10.3. Agile Methodologies in Video Game Development
  - 10.3.1. Scrum
  - 10.3.2. AGILE
  - 10.3.3. Hybrid Methodologies
- 10.4. Effort, Time and Cost Estimates
  - 10.4.1. Video Game Development Costs: Main Expense Concepts
  - 10.4.2. Task Scheduling: Critical Points, Keys and Aspects to Consider
  - 10.4.3. Estimates based on effort points vs Calculation in hours
- 10.5. Prototype Planning Prioritization
  - 10.5.1. General Project Objective Establishment
  - 10.5.2. Prioritization of Key Functionalities and Contents: Order and Needs by Department
  - 10.5.3. Grouping of Functionalities and Contents in Production to Constitute Deliverables (Functional Prototypes)
- 10.6. Best Practices in Video Game Production
  - 10.6.1. Meetings, Dailies, Weekly Meetings, End of Sprint Meetings, and ALPHA, BETA and RELEASE Milestone Review Meetings.
  - 10.6.2. Sprint Speed Measurement
  - 10.6.3. Lack of Motivation and Low Productivity Detection and Anticipation of Potential Production Problems
- 10.7. Production Analysis
  - 10.7.1. Preliminary Analysis 1: Market Status Review
  - 10.7.2. Preliminary Analysis 2: Establishment of Main Project References (Direct Competitors)
  - 10.7.3. Previous Analyses Conclusions
- 10.8. Development Cost Calculation
  - 10.8.1. Human resources.
  - 10.8.2. Technology and Licensing
  - 10.8.3. External Development Expenses
- 10.9. Investment Search
  - 10.9.1. Types of Investors
  - 10.9.2. Executive Summary
  - 10.9.3. Pitch Deck
  - 10.9.4. Publishers
  - 10.9.5. Self-Financing
- 10.10. Project Post-Mortem Elaboration
  - 10.10.1. Post-Mortem Elaboration Process in the Company
  - 10.10.2. Positive Aspect Analysis of the Project
  - 10.10.3. Negative Aspect Analysis of the Project
  - 10.10.4. Improvement Proposal on the Project's Negative Points and Conclusions

06

# Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.





“

*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

“

*At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world”*



*You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.*



*The student will learn to solve complex situations in real business environments through collaborative activities and real cases.*

### A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

**“** *Our program prepares you to face new challenges in uncertain environments and achieve success in your career”*

The case method has been the most widely used learning system among the world's leading business schools for as long as they have existed. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Over the course of 4 years, you will be presented with multiple practical case studies. You will have to combine all your knowledge, and research, argue, and defend your ideas and decisions.

## Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

*In 2019, we obtained the best learning results of all online universities in the world.*

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

*Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.*

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



This program offers the best educational material, prepared with professionals in mind:



### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.



### Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.



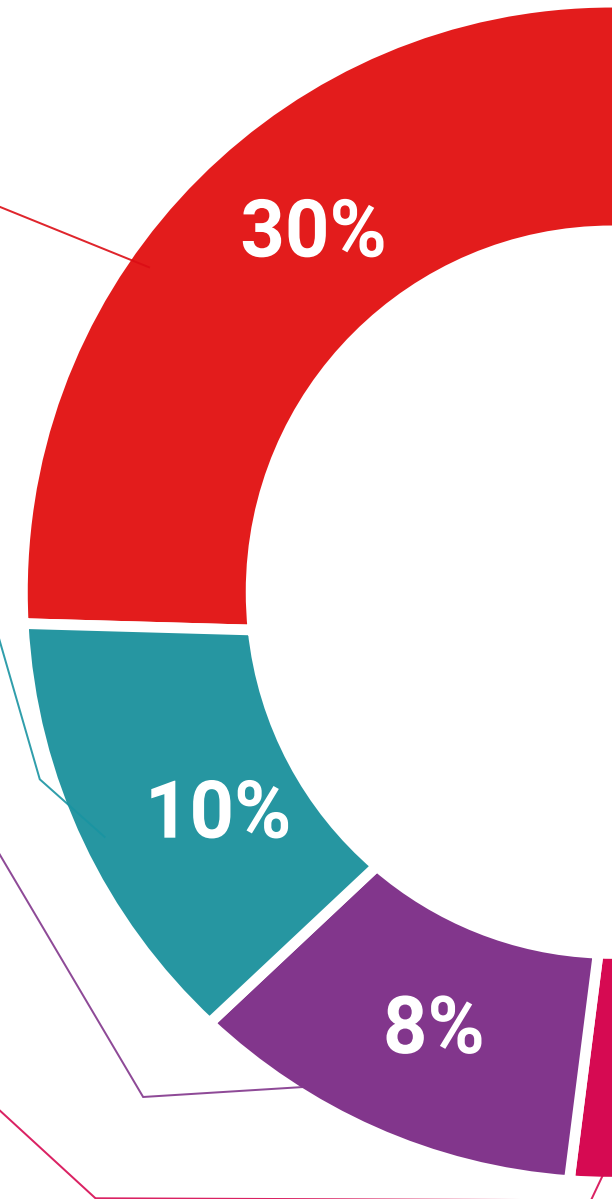
### Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization we live in.

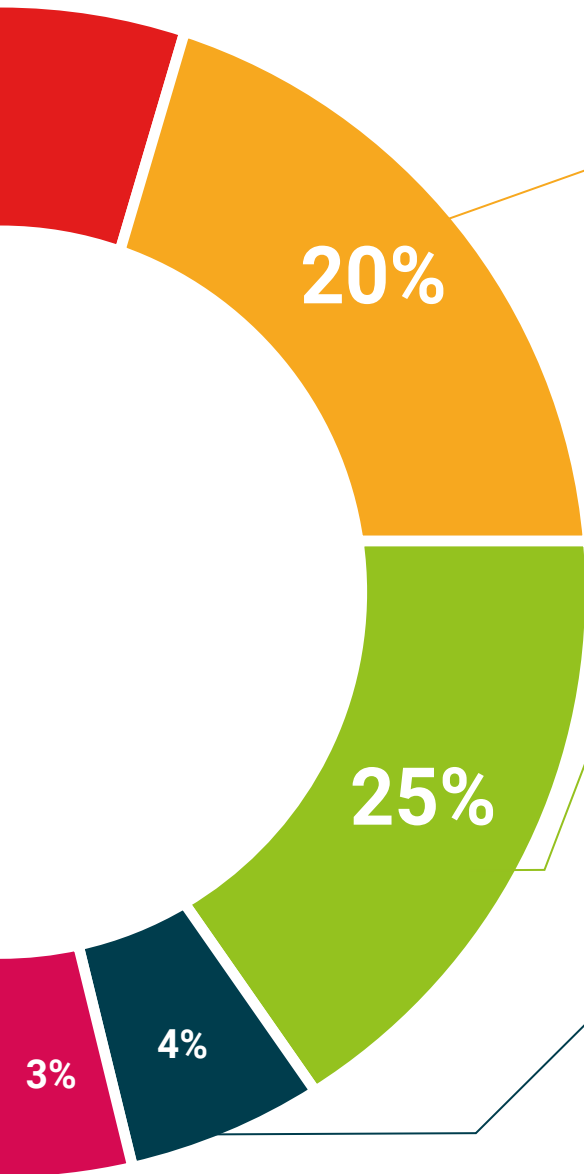


### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.







#### Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.



#### Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



#### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.



# 07 Certificate

The Master's Degree in 3D Animation and Virtual Reality guarantees students, in addition to the most rigorous and up-to-date education, access to a Master's Degree issued by TECH Global University.



“

*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork”*

This program will allow you to obtain your **Master's Degree diploma in 3D Animation and Virtual Reality** endorsed by **TECH Global University**, the world's largest online university.

**TECH Global University** is an official European University publicly recognized by the Government of Andorra ([official bulletin](#)). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

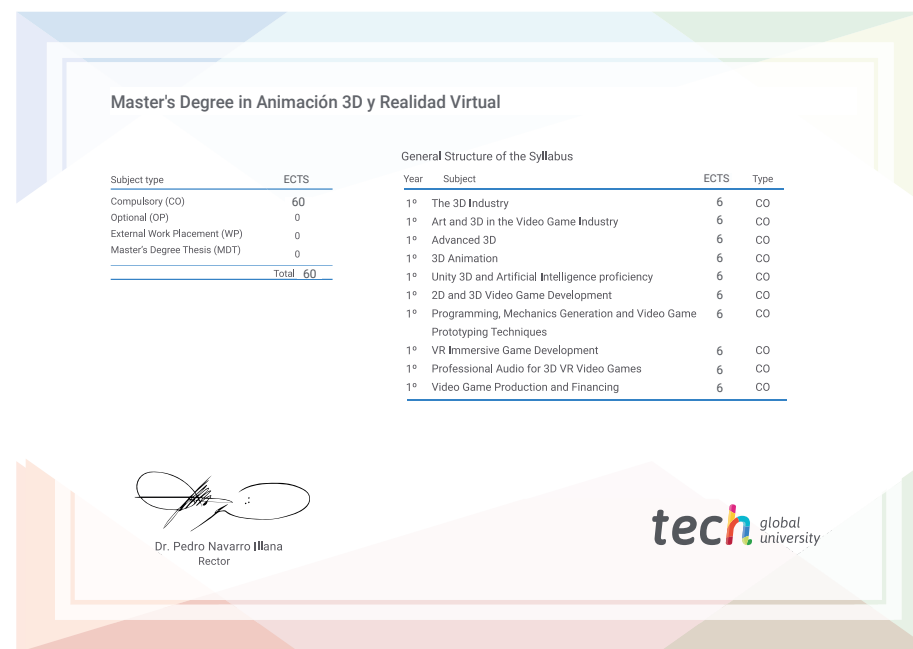
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Master's Degree in 3D Animation and Virtual Reality**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**



\*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present quality  
development language  
classroom



## Master's Degree 3D Animation and Virtual Reality

- » Modality: online
- » Duration: 12 months
- » Certificate: TECH Global University
- » Credits: 60 ECTS
- » Schedule: at your own pace
- » Exams: online

# Master's Degree 3D Animation and Virtual Reality