

# Postgraduate Certificate Algorithmics for 3D Video Game Development





## Postgraduate Certificate Algorithmics for 3D Video Game Development

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/design/postgraduate-certificate/algorithmics-3d-video-game-development](http://www.techtute.com/us/design/postgraduate-certificate/algorithmics-3d-video-game-development)

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# 01

# Introduction

For the development and creation of video games it is necessary, in addition to their 3D modeling, a plot that guides the development of the story, as well as an excellent production process and the ability to use digital algorithms to identify the main demands of the sector. This term, often coined and interpreted in the field of mathematics, is composed of steps that determine an action, which leads to different processes within the video game. This is, in more or less words, the effect produced by an action within the virtual world and the subsequent actions upon request of the command in play. This context justifies the creation of this program, in which the process to be carried out for the realization of a highly developed product will be studied in depth. This 100% online program will help the student to find solutions to problems that arise during the creation process. A program full of digital content that can be downloaded from any mobile device with an internet connection, allowing the student to review the syllabus whenever they wish.



```
4041 $dest_yy=$dest_x;
4042 $dest_xx=floor(( $dest_x * $source_x) / $source_y);
4043 )
4044 $source_id = imageCreateFromJPEG("$sourcefile");
4045 $target_id=imagecreatetruecolor($dest_xx, $dest_yy);
4046 $target_pic=imagecopyresampled($target_id,$source_id,0,0,0,$dest_xx,$dest_yy,$source_x,$source_y);
4047 imagejpeg ($target_id,"$targetfile",$jpegqual);
4048 }
4049 function watermark($plik, $targetfile, $watermark_color, $watermark_string, $watermark_size, $watermark_angle, $watermark_alpha)
4050 {
4051
4052 $hexStr = $watermark_color;
4053 $hexStr = preg_replace("/[^0-9A-Fa-f]/", "", $hexStr);
4054 $rgbArray = array();
4055 if (strlen($hexStr) == 6) {
4056     $colorVal = hexdec($hexStr);
4057     $rgbArray['red'] = 0xFF & ($colorVal >> 0x10);
4058     $rgbArray['green'] = 0xFF & ($colorVal >> 0x8);
4059     $rgbArray['blue'] = 0xFF & $colorVal;
4060 } elseif (strlen($hexStr) == 3) {
4061     $rgbArray['red'] = hexdec(str_repeat(substr($hexStr, 0, 1), 2));
4062     $rgbArray['green'] = hexdec(str_repeat(substr($hexStr, 1, 1), 2));
4063     $rgbArray['blue'] = hexdec(str_repeat(substr($hexStr, 2, 1), 2));
4064 } else {
4065     echo 'Error';
4066 }
4067
4068 list($szerokosc,$wysokosc) = getimagesize($plik);
4069 $obrazek = imagecreatefromjpeg($plik);
4070 $kolor = imagecolorallocate($obrazek, $rgbArray['red'],$rgbArray['green'],$rgbArray['blue']);
4071 $szerokosc_ost = 10;
4072 $wysokosc_ost = $wysokosc - 20;
4073 imagefttext(
4074     $obrazek,
4075     $watermark_size,
4076     $watermark_angle,
```

“

Learn about the algorithm and solve your computational problems during the process of creating a 3D piece for film, television or the video game industry"

Computer science, sometimes unmanageable due to its wide field of study and complexity, represents for the design professional an opportunity that allows him to speed up his creative process in the production of video games or 3D models. This knowledge is indispensable for the elaboration process, since tools such as Unity and 3D rendering are constantly being updated, so the student who knows the algorithm will be able to understand, handle and use these programs at will.

The field of design is so broad that in recent years professionals have had to update their knowledge. However, it is not enough to know how to mold, render and manage applications, when the industry itself requires knowledge of algorithms. This has made TECH take the decision to launch a program that allows students to expand their knowledge in everything related to the digital process for the development of 3D pieces, as well as virtual tools that allow them to expand the educational field of virtual reality, Unity or some artificial intelligence program.

The program presents the student with a diversified program tailored to current needs, full of different formats: detailed videos, practical exercises, complementary readings and interactive summaries. All this TECH offers will be at your fingertips, since its virtual campus is available 24 hours a day, with downloadable material from any mobile device with internet connection.

This **Postgraduate Certificate in Algorithmics for 3D Video Game Development** contains the most complete and up-to-date program on the market. The most important features include:

- ◆ The development of practical cases presented by experts in Video Games and Video Technologies
- ◆ 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



*TECH offers you the best programs on the market, helping you to go deeper into the most in-demand careers in the world today"*

“

*TECH will help you deepen the skills to be strengthened so that you can quickly upgrade and improve your skills to make a qualitative leap in the industry”*

The program's teaching staff includes professionals from the field 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 students will be assisted by an innovative interactive video system created by renowned and experienced experts.

*This program will facilitate and streamline your process to reach your professional goals.*

*You will have access to the virtual campus, without established schedules or timetables and from any mobile device with internet connection.*



# 02 Objectives

Algorithm plays a fundamental role in the development of video games, which is why the main objective that TECH has designed for this program is for its students to acquire specific knowledge that specializes in the design of 3D audiovisual pieces. And is that, in its commitment to ensure the professional growth of more and more graduates, they have developed a dynamic and comprehensive program, which aims to provide them with all the information they need to acquire specialized knowledge about flowcharts in computing, artificial intelligence, Unity or augmented reality.





“

*An innovative program that provides design professionals with information and allows them to broaden their knowledge based on the current needs of the industry”*



## General Objectives

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- ◆ 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 techniques and better practices for advanced programming

“

*TECH spends hundreds of hours in each of its programs, with the objective of creating certificates that adapt to the educational needs of its graduates and the requirements of the labor market”*





## Specific Objectives

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- ◆ 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

# 03

## Course Management

A program full of so much information and a deep area of study could not have less than a highly qualified teaching staff, and TECH has selected a group of professionals who are experts in the field. This team is also characterized by its human and teaching quality, aspects that will clearly be reflected in the thoroughness and dynamism with which it has been developed, both the syllabus as well as the additional material.



“

*A highly qualified teaching team  
dedicated to accompanying students  
in their educational process”*

## 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. Martínez Alonso, Sergio

- ♦ Co-founder and lead programmer at NoobO Games
- ♦ VET teacher of video games at Implika
- ♦ Porting for PlayStation4, XboxOne and Nintendo Switch at Stage Clear Studios
- ♦ Teaching experience at the University School of Design, Innovation and Technology
- ♦ Graduate in Video Game Design and Development. ESNE



```
mirror_mod.use_x = True
mirror_mod.use_y = True
mirror_mod.use_z = False
elif operation == "MIRROR_Z":
    mirror_mod.use_x = False
    mirror_mod.use_y = False
    mirror_mod.use_z = True

#selection at the end -add back the deselected mirror
mirror_ob.select= 1
modifier_ob.select=1
bpy.context.scene.objects.active = modifier_ob
print("Selected" + str(modifier_ob)) # modifier ob is the
mirror_ob.select = 0
obj = bpy.context.selected_objects[0]
obj.modifiers["Mirror"]_select = 1
```



# 04

## Structure and Content

TECH, willing to ensure that its graduates fully meet the demands of today's labor market, has designed a demanding, rigorous and exhaustive syllabus, which aims to nurture the student with universal knowledge, while maintaining, of course, the scope of the Postgraduate Certificate. That is why students will demonstrate versatility in their professional path. In addition, the syllabus is composed of diverse additional material and in different formats, as well as detailed videos about the Unity 3D tool and practical cases for its use.







“

*The program will seek to facilitate your learning, helping you to become a better professional and nurturing you with information for the resolution of any problem within the design sector”*

## Module 1. UNITY 3D: Video Game Development, Virtual Reality and Artificial Intelligence

- 1.1. Video Games. Unity 3D
  - 1.1.1. Video Games
  - 1.1.2. Video Games Errors and Hits
  - 1.1.3. Video Game Applications in Other Areas and Industries
- 1.2. Video Game Development. Unity 3D
  - 1.2.1. Production Plan and Development Phases
  - 1.2.2. Development Methodology
  - 1.2.3. Patches and Additional Content
- 1.3. Unity 3D
  - 1.3.1. Unity 3D. Applications
  - 1.3.2. *Scripting* in Unity 3D
  - 1.3.3. Asset Store and Third-Party Plugins
- 1.4. Physics, *Inputs*
  - 1.4.1. *InputSystem*
  - 1.4.2. Physics in Unity 3D
  - 1.4.3. *Animation* and *Animator*
- 1.5. Unity Prototyping
  - 1.5.1. *Blocking* and *Colliders*
  - 1.5.2. *Pre-Fabs*
  - 1.5.3. *Scriptable Objects*
- 1.6. Specific Programming Techniques
  - 1.6.1. Singleton Model
  - 1.6.2. Loading of Resources in the Execution of Windows Games
  - 1.6.3. Performance and *Profiler*
- 1.7. Video Games for Mobile Devices
  - 1.7.1. Games for Android Devices
  - 1.7.2. Games for IOS Devices
  - 1.7.3. Multiplatform Developments



- 1.8. Augmented Reality
  - 1.8.1. Types of Augmented Reality games
  - 1.8.2. ARkit and ARcore
  - 1.8.3. Vuforia Development
- 1.9. Artificial Intelligence Programming
  - 1.9.1. Artificial Intelligence Algorithms
  - 1.9.2. Finite State Machines
  - 1.9.3. Neural Networks
- 1.10. Distribution and Marketing
  - 1.10.1. The art of Publishing and Promoting a Video Game
  - 1.10.2. The Responsible for Success
  - 1.10.3. Strategies

“*Artificial intelligence programming will seem simple once you get through this program*”



# 05 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.



A photograph of a desk with a laptop, a blue pen, and a white marker. The image is split diagonally, with the top right corner being a solid teal color. The laptop is open, and the pen and marker are lying on the desk next to it. The background is slightly blurred, showing some papers and sticky notes.

“

*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 is the most widely used learning system in the best faculties in the world. 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 we face in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their 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.

With this methodology we have 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, markets, and financial 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.



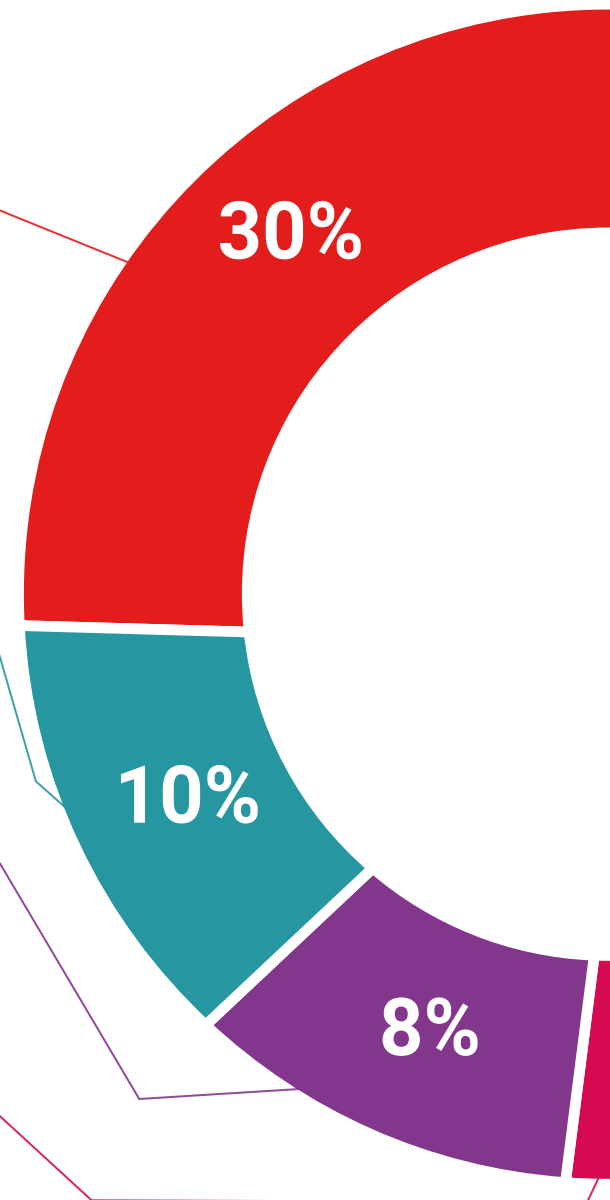
### Practising Skills and Abilities

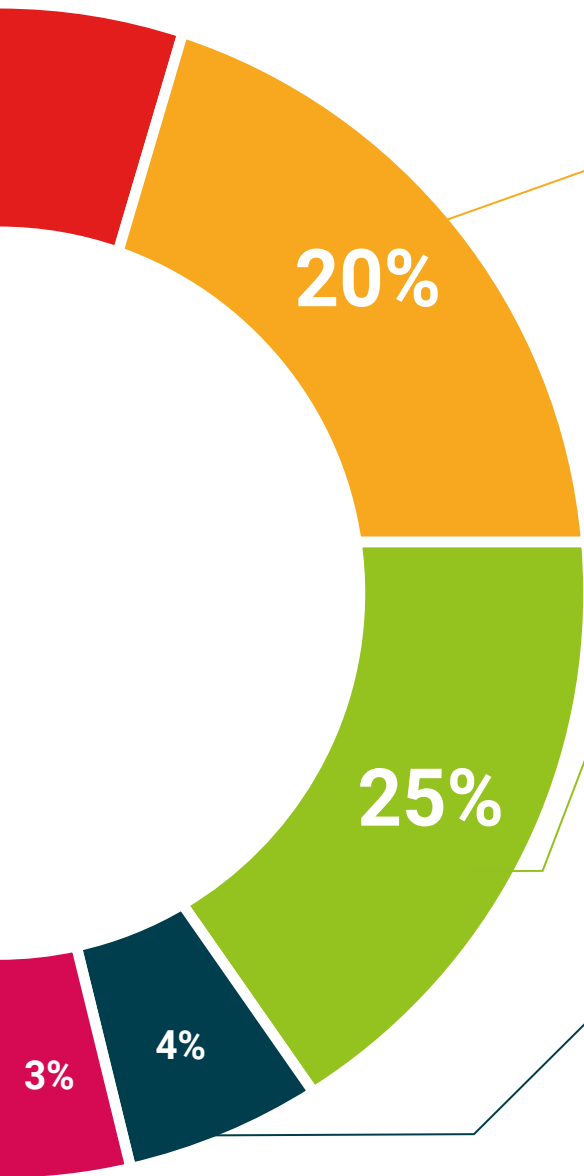
They will carry out activities to develop specific competencies and skills in each thematic area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



### 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.



06

# Certificate

The Postgraduate Certificate in Algorithmics for 3D Video Game Development guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.



“

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

This **Postgraduate Certificate in Algorithmics for 3D Video Game Development** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** via tracked delivery\*.

The diploma issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Certificate in Algorithmics for 3D Video Game Development**

Official N° of Hours: **150 h.**



\*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH EDUCATION 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  
development language  
virtual classroom



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# Postgraduate Certificate Algorithmics for 3D Video Game Development

```
space array */  
(gid_t user *grouplist,  
info to a user-space array */  
const struct group_info *group_info)  
groups_touser(gid_t user *grouplist,  
const struct group_info *group_info)  
int i;  
{  
    unsigned int count = group_info->ngroups;  
    int i;  
    unsigned int count = group_info->ngroups;  
    for (i = 0; i < group_info->nblocks; i++) {  
        unsigned int cpcount = min(NGROUPSPERBLOCK, count);  
        for (i = 0; i < group_info->nblocks; i++) {  
            unsigned int len = cpcount * sizeof(*grouplist);  
            count = min(NGROUPSPERBLOCK, count);  
            i);  
        }  
    }  
}
```