

# Postgraduate Certificate Video Game Programming Principles



## Postgraduate Certificate Video Game Programming Principles

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

Website: [www.techtute.com/us/videogames/postgraduate-certificate/video-game-programming-principles](http://www.techtute.com/us/videogames/postgraduate-certificate/video-game-programming-principles)

# Index

01

Introduction

---

*p. 4*

02

Objectives

---

*p. 8*

03

Structure and Content

---

*p. 12*

04

Methodology

---

*p. 16*

05

Certificate

---

*p. 24*

# 01

# Introduction

In order to appropriately develop a successful video game, it is necessary to have extensive knowledge of different disciplines. Programming is one of the most important, given that the code is the true nucleus of this type of product. Therefore, it is largely up to this work to ensure that the video game is free of errors, can be enjoyed without interruptions and that, ultimately, it succeeds. For this reason, it is important to master the principles of programming, as this will allow the professional to develop all types of games with great efficiency. This program provides its students with all the essential knowledge to become great experts in the field, increasing their chances for significant career advancement in the industry. All this, based on a 100% online methodology that will be adapted to your personal circumstances, and through the use of numerous multimedia materials.



“

*With this Postgraduate Certificate, you will master the essential principles of programming to be able to develop the best video games of the future in one of the companies you admire”*

The big video game design companies are a clear idea of their priorities when it comes to developing new products. Therefore, they know that one of the keys in the whole process is to have specialized professionals in each area who know perfectly all the specific requirements of their positions.

Programming is one of the most important issues in a video game development project, since it constitutes one of its essential parts. Programming is the work that will determine whether the product is developed properly. For this reason, having specialists focused on the field of video games is a priority for companies in the sector.

This Postgraduate Certificate in Video Game Programming Principles prepares students to fully master this field, so that upon completion of the program they can enter into large companies in the industry thanks to their new knowledge and skills.

In addition, with the innovative teaching methodology that TECH makes available to its students, they will be able to combine their professional careers, their personal lives and their studies, since these are carried out in a 100% online format that adapts to each of them.

This **Postgraduate Certificate in Video Game Programming Principles** contains the most complete and up-to-date educational program on the market. The most important features include:

- ◆ Practical cases presented by experts in video game programming and development
- ◆ The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- ◆ Practical exercises where the self-assessment process can be carried out to improve learning
- ◆ Special emphasis on innovative methodologies
- ◆ 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



*The best companies in the sector are looking for talented people like you. Specialize and succeed in advancing your career quickly"*

“

*You will know all you need to know about programming to boost your career in the video game industry thanks to this Postgraduate Certificate”*

The teaching staff of this program includes professionals from the industry, who contribute the experience of their work to this program, in addition to recognized specialists from reference 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 learning 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 throughout the program. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced experts.

*This Postgraduate Certificate will immediately improve your professional prospects. Don't wait any longer and enroll.*

*Your new knowledge will help you to stand out in the competitive market of video game design.*



# 02 Objectives

This main objective of this Postgraduate Certificate in Video Game Programming Principles is to make students progress professionally and, in order to achieve this, it proposes a high-level learning process. Through this process, students will be able to learn everything they need to become great specialists in video game programming, making large companies in the sector want to count on them to carry out their best projects.



“

*Your goals will be much closer when you complete this Postgraduate Certificate”*



## General Objectives

---

- ◆ Become familiar the different programming languages and methods applied to video games
- ◆ Delve deeper into the video game production process and integrate programming throughout each stage
- ◆ Master the basic programming languages used in video games
- ◆ Understand the role of programming in video game development

“ *This Postgraduate Certificate is what you need to achieve your professional goals* ”





## Specific Objectives

---

- ◆ Understand the basic structure of computers, software and the general purpose programming languages
- ◆ Analyze the essential elements of a computer program, such as the different data types, operators, expressions, statements, I/O and control statements
- ◆ Interpret algorithms as the necessary basis to develop computer programs
- ◆ Discover video game engine operation and architecture
- ◆ Understand the basic features of existing game engines
- ◆ Correctly and efficiently program applications applied to video game engines
- ◆ Choose the most appropriate paradigm and programming languages to program applications applied to video game engines

# 03

## Structure and Content

The contents of this Postgraduate Certificate in Video Game Programming Principles have been designed taking into account the state of the industry. With this, TECH ensures that its students aspire to the best professional positions, since it offers them the best possible syllabus, fully adapted to the reality of the industry, which requires its workers to have a high degree of specialization. For that reason, students will be in the best position to achieve significant career progression when they complete this program.



“

*Here are the contents you were looking for to progress professionally in the world of video games”*

## Module 1. Programming Fundamentals

- 1.1. Introduction to Programming
  - 1.1.1. Basic Computer Structure
  - 1.1.2. Software
  - 1.1.3. Programming Languages
  - 1.1.4. Computer Application Life Cycle
- 1.2. Algorithm Design
  - 1.2.1. Problem Solving
  - 1.2.2. Descriptive Techniques
  - 1.2.3. Algorithm Elements and Structure
- 1.3. Program Elements
  - 1.3.1. C++ Origin and Features
  - 1.3.2. Development Environment
  - 1.3.3. Concept of Program
  - 1.3.4. Types of Fundamental Data
  - 1.3.5. Operators
  - 1.3.6. Expressions
  - 1.3.7. Statements
  - 1.3.8. Data Input and Output
- 1.4. Control Statements
  - 1.4.1. Statements
  - 1.4.2. Branches
  - 1.4.3. Loops
- 1.5. Abstraction and Modularity: Function
  - 1.5.1. Modular Design
  - 1.5.2. Concept of Function and Utility
  - 1.5.3. Definition of Function
  - 1.5.4. Execution Flow When Function Is Called
  - 1.5.5. Function Prototypes
  - 1.5.6. Results Return
  - 1.5.7. Calling Functions: Parameters
  - 1.5.8. Parameter Passing According to Reference and Value
  - 1.5.9. Scope Identifier
- 1.6. Statistical Data Structures
  - 1.6.1. Arrays
  - 1.6.2. Matrices Polyhedra
  - 1.6.3. Searching and Sorting
  - 1.6.4. Chaining: I/O Functions for Chains
  - 1.6.5. Structures: Unions
  - 1.6.6. New Types of Data
- 1.7. Dynamic Data Structures:
  - 1.7.1. Concept. Definition of Pointer
  - 1.7.2. Pointer Operators and Operations
  - 1.7.3. Pointer Arrays
  - 1.7.4. Pointers and Arrays
  - 1.7.5. Chain Pointers
  - 1.7.6. Structure Pointers
  - 1.7.7. Multiple Indirection
  - 1.7.8. Function Pointers
  - 1.7.9. Function, Structure and Array Passing as Function Parameters
- 1.8. Files
  - 1.8.1. Basic Concepts
  - 1.8.2. File Operations
  - 1.8.3. Types of Files
  - 1.8.4. File Organization
  - 1.8.5. Introduction to C++ Files
  - 1.8.6. Managing Files
- 1.9. Recursion
  - 1.9.1. Definition of Recursion
  - 1.9.2. Types of Recursion
  - 1.9.3. Advantages and Disadvantages
  - 1.9.4. Considerations
  - 1.9.5. Recursive-Iterative Conversion
  - 1.9.6. Recursion Stack

- 1.10. Testing and Documentation
  - 1.10.1. Program Testing
  - 1.10.2. White Box Testing
  - 1.10.3. Black Box Testing
  - 1.10.4. Testing Tools
  - 1.10.5. Program Documentation

## Module 2. Video Game Engines

- 2.1. Video Games and Information Communication Technology (ICT)
  - 2.1.1. Introduction
  - 2.1.2. Opportunities
  - 2.1.3. Challenges
  - 2.1.4. Conclusions
- 2.2. History of Video Game Engines
  - 2.2.1. Introduction
  - 2.2.2. Atari
  - 2.2.3. The 80s
  - 2.2.4. First Engines. The 90s
  - 2.2.5. Current Engines
- 2.3. Video Game Engines
  - 2.3.1. Types of Engines
  - 2.3.2. Video Game Engine Parts
  - 2.3.3. Current Engines
  - 2.3.4. Selecting an Engine for Our Project
- 2.4. Motor Game Maker
  - 2.4.1. Introduction
  - 2.4.2. Scenarios Design
  - 2.4.3. Sprites and Animations
  - 2.4.4. Collisions
  - 2.4.5. Scripting in Game Maker Languages (GML)
- 2.5. Unreal Engine 4: Introduction
  - 2.5.1. What Is Unreal Engine 4? What Is Its Philosophy?
  - 2.5.2. Materials
  - 2.5.3. UI
  - 2.5.4. Animations
  - 2.5.5. Particle Systems
  - 2.5.6. Artificial Intelligence
  - 2.5.7. Frames Per Second (FPS)
- 2.6. Unreal Engine 4: Visual Scripting
  - 2.6.1. Blueprints and Visual Scripting Philosophy
  - 2.6.2. Debugging
  - 2.6.3. Types of Variables
  - 2.6.4. Basic Flow Control
- 2.7. Unity 5 Engine
  - 2.7.1. C# and Visual Studio Programming
  - 2.7.2. Creating Prefabs
  - 2.7.3. Using Gizmos to Control Video Games
  - 2.7.4. Adaptive Engine: 2D and 3D
- 2.8. Godot Engine
  - 2.8.1. Godot Design Philosophy
  - 2.8.2. Object- and Composition-Oriented Design
  - 2.8.3. All in One Package
  - 2.8.4. Open and Community-Driven Software
- 2.9. RPG Maker Engine
  - 2.9.1. RPG Maker Philosophy
  - 2.9.2. Taking as a Reference
  - 2.9.3. Creating a Game with Personality
  - 2.9.4. Commercially Successful Games
- 2.10. Source 2 Engine
  - 2.10.1. Source 2 Philosophy
  - 2.10.2. Source and Source 2: Evolution
  - 2.10.3. Use of the Community: Audiovisual Content and Video Games
  - 2.10.4. Future of Source 2 Engine
  - 2.10.5. Successful Mods and Games

# 04

# 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.



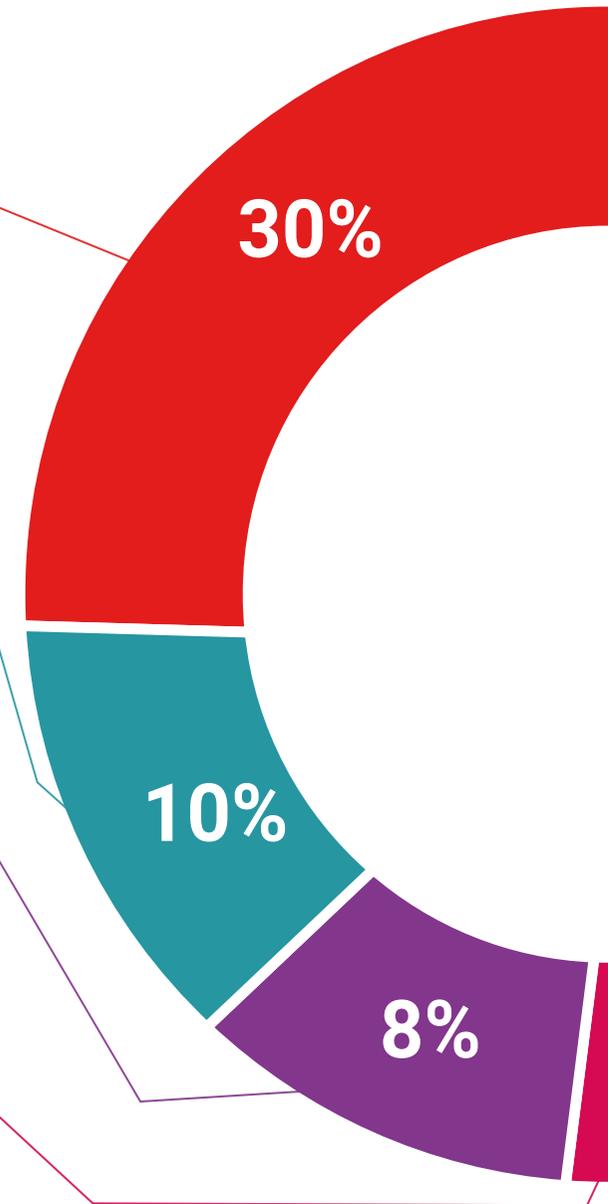
### Practising Skills and Abilities

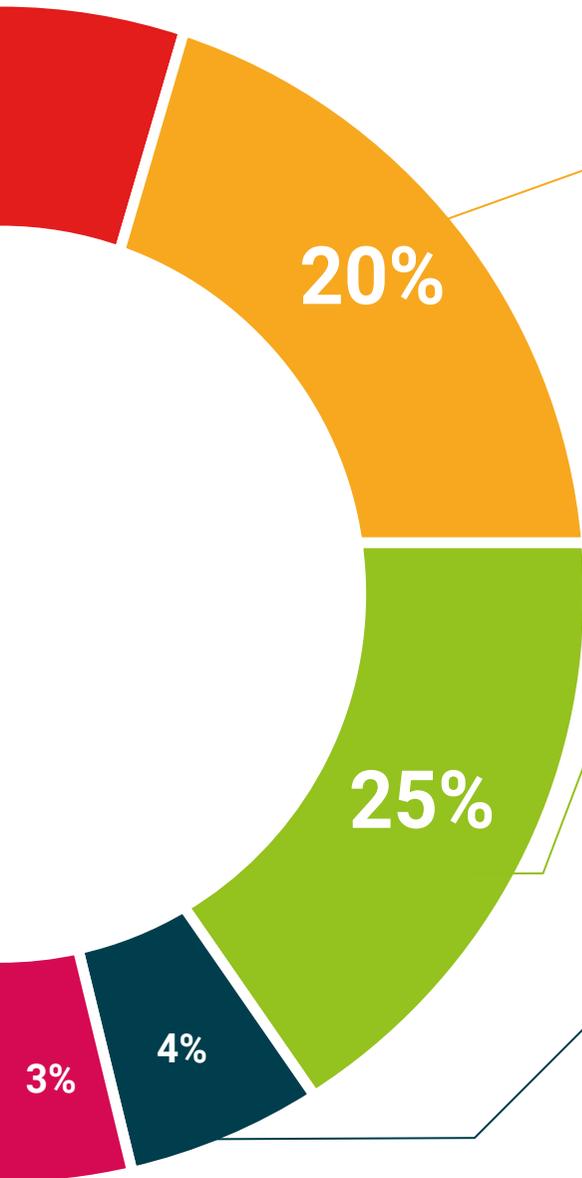
They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization we live in.



### 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.



# 05 Certificate

The Postgraduate Certificate in Video Game Programming Principles guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate 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 **Postgraduate Certificate in Video Game Programming Principles** 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: **Postgraduate Certificate in Video Game Programming Principles**

Modality: **online**

Duration: **12 weeks**

Accreditation: **12 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  
development language  
classroom



## Postgraduate Certificate Video Game Programming Principles

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

# Postgraduate Certificate

## Video Game Programming Principles

