

# Postgraduate Diploma Video Game Programming Languages



## Postgraduate Diploma Video Game Programming Languages

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

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

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# 01

# Introduction

To develop a successful video game, it is insufficient to have a general body of knowledge of programming. This field has so many specificities that, in order to be able to write good code, extremely specific knowledge of video games is required. It is not only necessary to know the usual programming languages to be able to participate in the production of a new title, to be successful it is also necessary to master the specific languages used in this area. For this reason, this course offers its students all the keys to become expert programmers specialized in video games, guaranteeing them access to a large company in the industry.

```
#include <stdint.h>
```

“

*Master the essential programming languages  
to develop the best games in the world”*



Programming is one of the most complex tasks involved in the digital realm. Any digital device is composed of hundreds or thousands of lines of code written by an expert developer. And there are programmers who can devote themselves to broad fields by mastering certain languages of general application.

However, the video game industry is different, as it utilizes a number of languages and presents a series of nuances that should be known in order to effectively develop games. This Postgraduate Diploma in Video Game Programming Languages has all the content and knowledge to make students true experts in video game development.

To do so, this course teaches them issues in depth, such as object-oriented programming, web development and 3D modeling, thereby combining complementary areas to obtain a comprehensive learning that will enable students to access the best video game companies in the world.

This **Postgraduate Diploma in Video Game Programming Languages** contains the most complete and up to date program on the market. Its most notable features are:

- » Case studies presented by experts in video game 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
- » Its 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



*Programming is essential in a video game development. Specialize and become an essential professional in your company"*

“

*Develop the best video games thanks to the skills you will acquire during the course”*

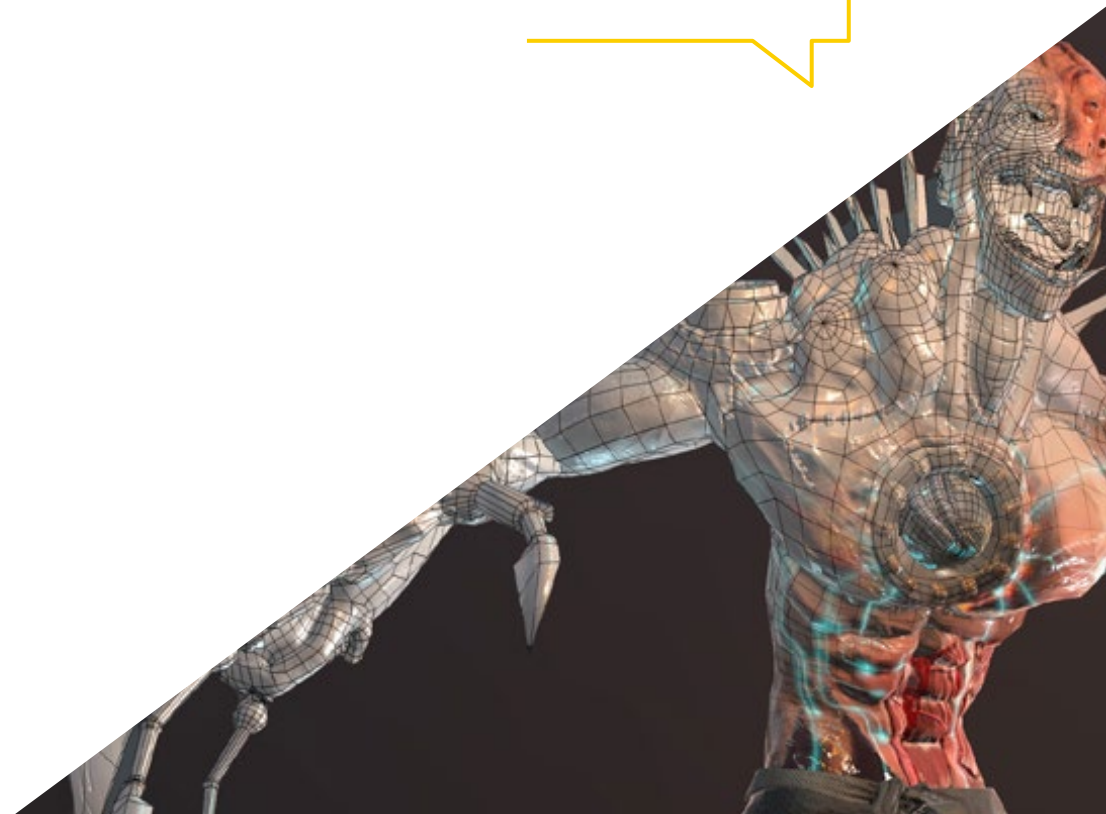
The program's teaching staff includes professionals from sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious universities.

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 specialization 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.

*The video game industry needs talented programmers like you.*

*The languages used to program video games require adequate specialization. With this Postgraduate Diploma, you will learn everything you need to know about them.*



# 02 Objectives

The main objective of this Postgraduate Diploma in Video Game Programming Languages is to offer students the best knowledge on the subject, so they can become specialists in the field and thus access the best positions in the industry. For that reason, the course takes on a completely professional character, so students have the opportunity to work with the best companies in the industry.





“

*You want to program video games at the highest level and this Postgraduate Diploma will help you achieve precisely that”*



## General Objectives

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- » Become familiar with the different programming methods used in video games
- » Delve into video game production processes and integrating programming into these stages
- » Master basic programming languages used in video games
- » Apply knowledge of software engineering and specialized programming to video game development
- » Understand the role of programming in video game development
- » Develop web-based video games



*Enroll and watch your skills open doors to the video game industry”*





## Specific Objectives

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### Module 1. Object-Oriented Programming

- » Know the different design patterns for object-oriented problems
- » Understand the importance of documentation and testing in software development
- » Manage the use of threading and synchronization, and solve common problems in concurrent programming

### Module 2. 3D Modeling

- » Ascertain the internal structure of a video game engine
- » Establish the elements of a modern video game architecture
- » Understand the functions of every component in a video game
- » Examine examples of video games in 2D and 3D graphics

### Module 3. Web Game Design and Development

- » Design games and interactive web applications with the corresponding documentation
- » Evaluate the main features of games and interactive web applications for professional and adequate communication

# 03

## Structure and Content

This Postgraduate Diploma in Video Game Programming Languages contains the best syllabus on the subject, since it has been designed by the best experts in video game development. These specialists know the industry in detail, so they know what the companies in the field need and, thus, they can transmit to students all the keys to succeed. This program is the best alternative for all those who wish to specialize in video game programming and are at a loss as to how.







“

*The best program in terms of video game development.  
With it you will become a real specialist”*



## Module 1. Object-Oriented Programming

- 1.1. Introduction to Object-Oriented Programming
  - 1.1.1. Introduction to Object-Oriented Programming
  - 1.1.2. Class Design
  - 1.1.3. Introduction to Unified Modeling Language (UML) for Problem Modeling
- 1.2. Class Relations
  - 1.2.1. Abstractions and Heritage
  - 1.2.2. Advanced Concepts of Heritage
  - 1.2.3. Polymorphism
  - 1.2.4. Composition and Aggregation
- 1.3. Introduction to Design Patterns for Object-Oriented Problems
  - 1.3.1. What Are Design Patterns?
  - 1.3.2. Factory Pattern
  - 1.3.3. Singleton Pattern
  - 1.3.4. Observer Pattern
  - 1.3.5. Composite Pattern
- 1.4. Exceptions
  - 1.4.1. What Are Exceptions?
  - 1.4.2. Catching and Handling Exceptions
  - 1.4.3. Launching Exceptions
  - 1.4.4. Creating Exceptions
- 1.5. User Interface
  - 1.5.1. Introduction to Qt
  - 1.5.2. Positioning
  - 1.5.3. What Are Events?
  - 1.5.4. Events: Definition and Catching
  - 1.5.5. User Interface Development



- 1.6. Introduction to Concurrent Programming
  - 1.6.1. Introduction to Concurrent Programming
  - 1.6.2. Concept of Process and Thread
  - 1.6.3. Process and Thread Interaction
  - 1.6.4. C++ Threads
  - 1.6.5. Advantages and Disadvantages of Concurrent Programming
- 1.7. Thread Management and Synchronization
  - 1.7.1. Thread Life Cycle
  - 1.7.2. *Thread* Class
  - 1.7.3. Thread Planning
  - 1.7.4. Thread Groups
  - 1.7.5. Demon Threads
  - 1.7.6. Synchronization
  - 1.7.7. Locking Mechanisms
  - 1.7.8. Communication Mechanisms
  - 1.7.9. Monitors
- 1.8. Common Problems in Concurrent Programming
  - 1.8.1. Producer-Consumer Problem
  - 1.8.2. Readers-Writers Problem
  - 1.8.3. Dining Philosophers Problem
- 1.9. Software Testing and Documentation
  - 1.9.1. Why Is it Important to Document Software?
  - 1.9.2. Design Documentation
  - 1.9.3. Documentation Tool Use
- 1.10. Software Tests
  - 1.10.1. Introduction to Software Tests
  - 1.10.2. Types of Tests
  - 1.10.3. Unit Test
  - 1.10.4. Integration Test
  - 1.10.5. Validation Test
  - 1.10.6. System Test

## Module 2. Modeling

- 2.1. Introduction to C#
  - 2.1.1. What is OOP?
  - 2.1.2. Visual Studio Environment
  - 2.1.3. Types of Data
  - 2.1.4. Type Conversions
  - 2.1.5. Conditionals
  - 2.1.6. Objects and Classes
  - 2.1.7. Modularity and Encapsulation
  - 2.1.8. Heritage
  - 2.1.9. Abstract Classes
  - 2.1.10. Polymorphism
- 2.2. Fundamentals of Mathematics
  - 2.2.1. Mathematical Tools in Physics: Scalar and Vector Quantities
  - 2.2.2. Mathematical Tools in Physics: Scalar Product
  - 2.2.3. Mathematical Tools in Physics: Vector Product
  - 2.2.4. Mathematical Tools in OOP
- 2.3. Physical Principles
  - 2.3.1. Rigid Solids
  - 2.3.2. Kinematics
  - 2.3.3. Dynamics
  - 2.3.4. Collisions
  - 2.3.5. Projectiles
  - 2.3.6. Flying

- 2.4. Fundamentals of Computer Graphics
  - 2.4.1. Graphics Systems
  - 2.4.2. 2D Graphics
  - 2.4.3. 3D Graphics
  - 2.4.4. Raster Systems
  - 2.4.5. Geometric Modeling
  - 2.4.6. Eliminating Hidden Parts
  - 2.4.7. Realistic Visualization
  - 2.4.8. OpenGL Graphics Library
- 2.5. Unity: Introduction and Installation
  - 2.5.1. What Is Unity?
  - 2.5.2. Why Unity?
  - 2.5.3. Features of Unity
  - 2.5.4. Installation.
- 2.6. Unity: 2D and 3D
  - 2.6.1. 2D Gameplay: Sprites and Tilemaps
  - 2.6.2. 2D Gameplay: 2D Physics
  - 2.6.3. Unity 2D Video Game Examples
  - 2.6.4. Introduction to Unity 3D
- 2.7. Unity: Instantiation and Object Creation
  - 2.7.1. Adding Components
  - 2.7.2. Deleting Components
  - 2.7.3. Importing Assets and Textures
  - 2.7.4. Supplies and Maps for Materials
- 2.8. Unity: Interaction and Physics
  - 2.8.1. Rigidbody
  - 2.8.2. Colliders
  - 2.8.3. Joints
  - 2.8.4. Character Controllers
  - 2.8.5. Continuous Collision Detection (CCD)
  - 2.8.6. Physics Debug Visualization

- 2.9. Unity: Basic Artificial Intelligence (AI) for NPCs
  - 2.9.1. Pathfinding in Unity: Navmesh
  - 2.9.2. AI Enemies
  - 2.9.3. NPC Action Tree
  - 2.9.4. NPC Hierarchy and Scripts
- 2.10. Unity: Animation Fundamentals and Implementation
  - 2.10.1. Animation Controller: Character Association
  - 2.10.2. Blend Tree
  - 2.10.3. State Transitions
  - 2.10.4. Transition Threshold Modification

## Module 3. Web Game Design and Development

- 3.1. Web Origins and Standards
  - 3.1.1. The Origin of the Internet
  - 3.1.2. The Creation of the *World Wide Web*
  - 3.1.3. First Web Standards
  - 3.1.4. The Rise of Web Standards
- 3.2. HTTP and Client-Server Structure
  - 3.2.1. Client-Server Role
  - 3.2.2. Client-Server Communication
  - 3.2.3. Recent History
  - 3.2.4. Centralized Computing
- 3.3. Web Programming: Introduction
  - 3.3.1. Basic Concepts
  - 3.3.2. Preparing Web Servers
  - 3.3.3. Basic Concepts of HTML5
  - 3.3.4. HTML Forms
- 3.4. Introduction to HTML and Examples
  - 3.4.1. HTML5 History
  - 3.4.2. HTML5 Elements
  - 3.4.3. Application Programming Interface (API)
  - 3.4.4. CCS3

- 3.5. Document Object Model
  - 3.5.1. What Is a Document Object Model?
  - 3.5.2. Using DOCTYPE
  - 3.5.3. The Importance of Validating the HTML
  - 3.5.4. Accessing Elements
  - 3.5.5. Creating Elements and Texts
  - 3.5.6. Using innerHTML
  - 3.5.7. Deleting an Element or Text Node
  - 3.5.8. Reading and Writing Element Attributes
  - 3.5.9. Manipulating Element Styles
  - 3.5.10. Attaching Multiple Files at Once
- 3.6. Introduction to CSS and Examples
  - 3.6.1. CSS3 Syntax
  - 3.6.2. Style Sheets
  - 3.6.3. Labels
  - 3.6.4. Selectors
  - 3.6.5. CSS Web Design
- 3.7. Introduction to JavaScript and Examples
  - 3.7.1. What Is JavaScript?
  - 3.7.2. A Brief History of the Language
  - 3.7.3. JavaScript Versions
  - 3.7.4. Displaying Dialog Boxes
  - 3.7.5. JavaScript Syntax
  - 3.7.6. Understanding *Scripts*
  - 3.7.7. Spaces
  - 3.7.8. Comments
  - 3.7.9. Functions
  - 3.7.10. On-Page and External JavaScript
- 3.8. JavaScript Functions
  - 3.8.1. Function Declaration
  - 3.8.2. Function Expression
  - 3.8.3. Calling Functions
  - 3.8.4. Recursion
  - 3.8.5. Nested Functions and Closures
  - 3.8.6. Variable Preservation
  - 3.8.7. Multiple Nested Functions
  - 3.8.8. Name Conflicts
  - 3.8.9. Closings or Closures
  - 3.8.10. Function Parameters
- 3.9. PlayCanvas for Web Game Development
  - 3.9.1. What Is PlayCanvas?
  - 3.9.2. Project Configuration
  - 3.9.3. Creating an Object
  - 3.9.4. Adding Physics
  - 3.9.5. Adding Models
  - 3.9.6. Changing the Gravity and Scene Settings
  - 3.9.7. Executing Scripts
  - 3.9.8. Camera Control
- 3.10. Phaser for Web Game Development
  - 3.10.1. What Is Phaser?
  - 3.10.2. Loading Resources
  - 3.10.3. Building the World
  - 3.10.4. Platforms
  - 3.10.5. Players
  - 3.10.6. Adding Physics
  - 3.10.7. Using the Keyboard
  - 3.10.8. *Pickups*
  - 3.10.9. Points and Scoring
  - 3.10.10. Bouncing Bombs



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.*





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

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.



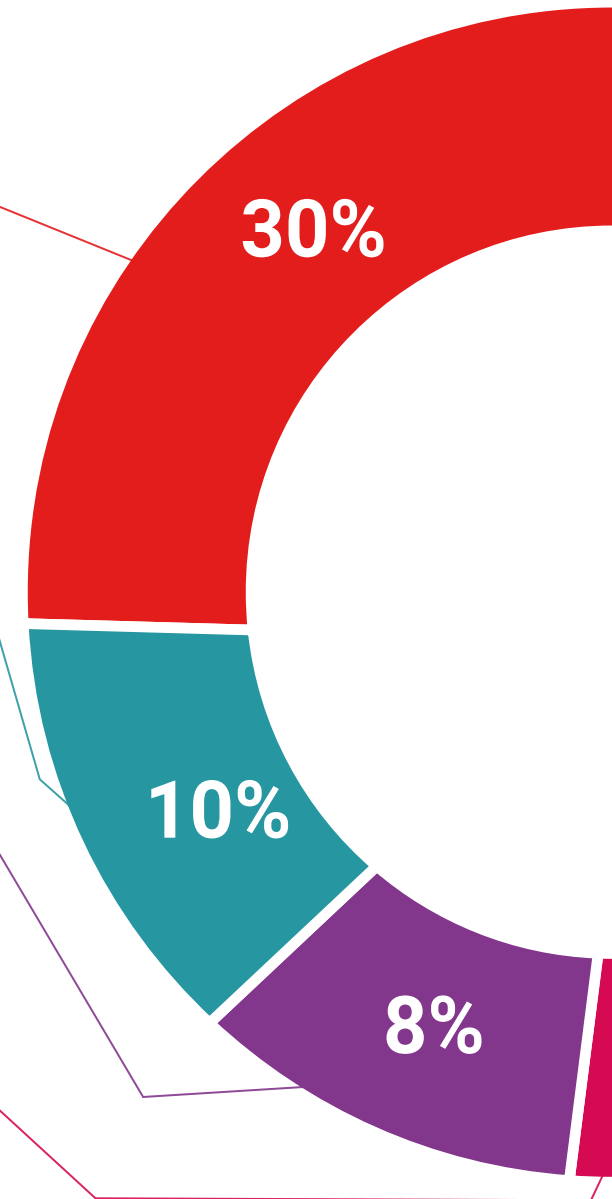
#### Practising Skills and Abilities

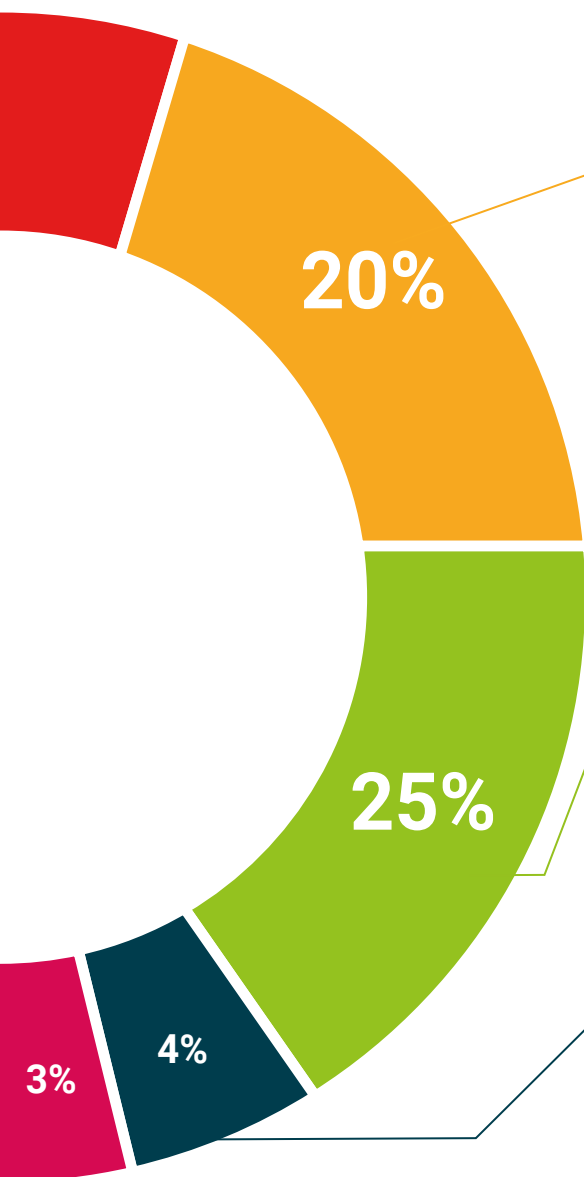
They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization we live in.



#### 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 Diploma in Video Game Programming Languages guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Technological University.



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

This **Postgraduate Diploma in Video Game Programming Languages** 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 Diploma** issued by **TECH Technological University** via tracked delivery\*.

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

Title: **Postgraduate Diploma in Video Game Programming Languages**

Official N° of hours: **450 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 languages  
virtual classroom



## Postgraduate Diploma Video Game Programming Languages

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

# Postgraduate Diploma

## Video Game Programming

### Languages

