

# Postgraduate Certificate Computer Graphics and Visualization





## Postgraduate Certificate Computer Graphics and Visualization

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Global University
- » Credits: 6 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/information-technology/postgraduate-certificate-computer-graphics-visualization](http://www.techtute.com/us/information-technology/postgraduate-certificate-computer-graphics-visualization)

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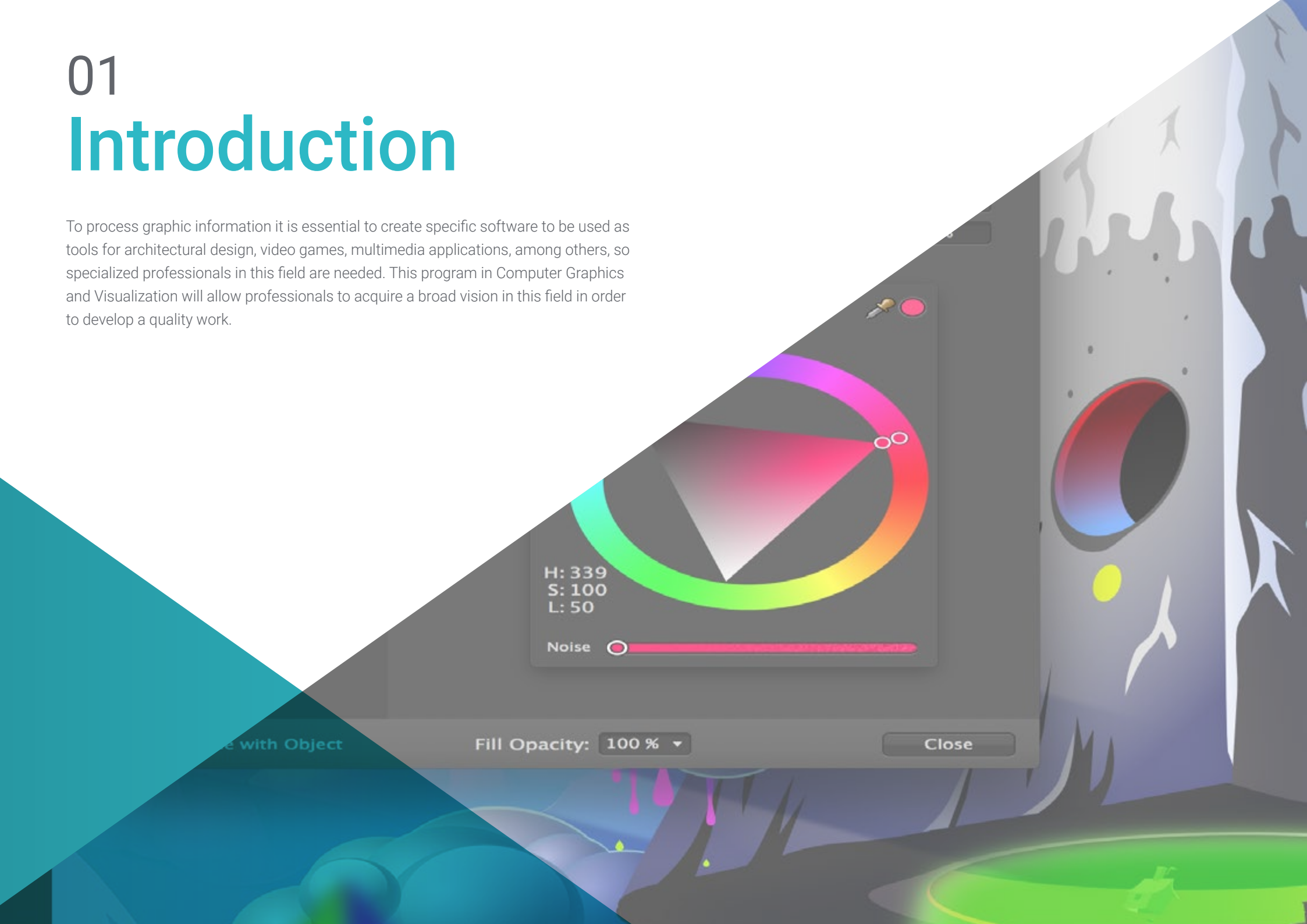
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# 01

# Introduction

To process graphic information it is essential to create specific software to be used as tools for architectural design, video games, multimedia applications, among others, so specialized professionals in this field are needed. This program in Computer Graphics and Visualization will allow professionals to acquire a broad vision in this field in order to develop a quality work.





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*IT professionals must continue their specialization to adapt to new developments in this field"*

The teaching team of this Postgraduate Certificate in Computer Graphics and Visualization will make a careful selection of each of the topics of this program in order to offer the students a study opportunity as complete as possible and always related to current events.

The program focuses on color theory, 2D and 3D transformations, parametric curves or hidden surfaces, among other aspects of Computer Graphics and Visualization that will give the professionals an overview of the techniques applied to the generation and manipulation of computer graphics.

This program provides students with specific tools and skills to successfully develop their professional activity in the wide environment of computer graphics and visualization. It works on key competencies such as the knowledge of the reality and daily practice in different IT areas and develops responsibility in the monitoring and supervision of their work, as well as specific skills within this field.

Additionally, as it is a 100% online program, the student is not constrained by fixed schedules or the need to move to another physical location, but can access the contents at any time of the day, balancing their professional or personal life with their academic life.

This **Postgraduate Certificate in Computer Graphics and Visualization** contains the most complete and up-to-date educational program on the market. Its most outstanding features are:

- ◆ Development of case studies presented by experts in Computer Engineering
- ◆ 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 self-assessment can be used to improve learning
- ◆ Special emphasis on innovative methodologies in computer graphics and visualization
- ◆ 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

“*Join a growing community and learn yourself with the best. You will increase your professionalism in a comfortable way*”

“ *This Postgraduate Certificate is the best investment you can make when selecting a refresher program to update your knowledge in Computer Graphics and Visualization* ”

Its teaching staff includes professionals belonging to the field of Information Technology, who bring to this program the experience of their work, as well as recognized specialists from leading companies and prestigious universities.

Its 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 an immersive education programmed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professionals must try to solve the different professional practice situations that are presented throughout the program. For this purpose, the professional will be assisted by an innovative interactive video system developed by renowned experts in computer graphics and visualization with extensive experience in the field.

*This program comes with the best educational material, providing you with a contextual approach that will facilitate your learning.*

*This 100% online Postgraduate Certificate will allow you to combine your studies with your professional work while increasing your knowledge in this field.*



# 02 Objectives

The Postgraduate Certificate in Computer Graphics and Visualization is designed to facilitate the performance of the professionals in this field to enable them to master the main developments in this IT field.







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*This is the best option to learn about the latest advances in Computer Graphics and Visualization”*



## General Objective

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- ◆ Prepare scientifically and technologically, as well as to develop the professional practice of Computer Graphics and Visualization with a transversal and versatile approach adapted to the new technologies and innovations in this field

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*Do not miss the opportunity to take this Postgraduate Certificate in Computer Graphics and Visualization. It's the perfect opportunity to advance your career”*





## Specific Objectives

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- ◆ Introduce the essential concepts of computer graphics and computer visualization, such as color theory and its models and the properties of light
- ◆ Understand the functioning of output primitives and their algorithms, both for the drawing of lines and for the drawing of circles and fills
- ◆ Delve into the study of the different transformations, both 2D and 3D, and their coordinate systems and computer visualization
- ◆ Learn how to make projections and cuts in 3D, as well as the elimination of hidden surfaces
- ◆ Learn the theory related to interpolation and parametric curves, as well as Bézier curves and *B-Splines*

03

# Structure and Content

The structure of the contents has been designed by the best professionals in the field of Computer Engineering with extensive experience and recognized prestige in the profession.

R A C C I Ó N

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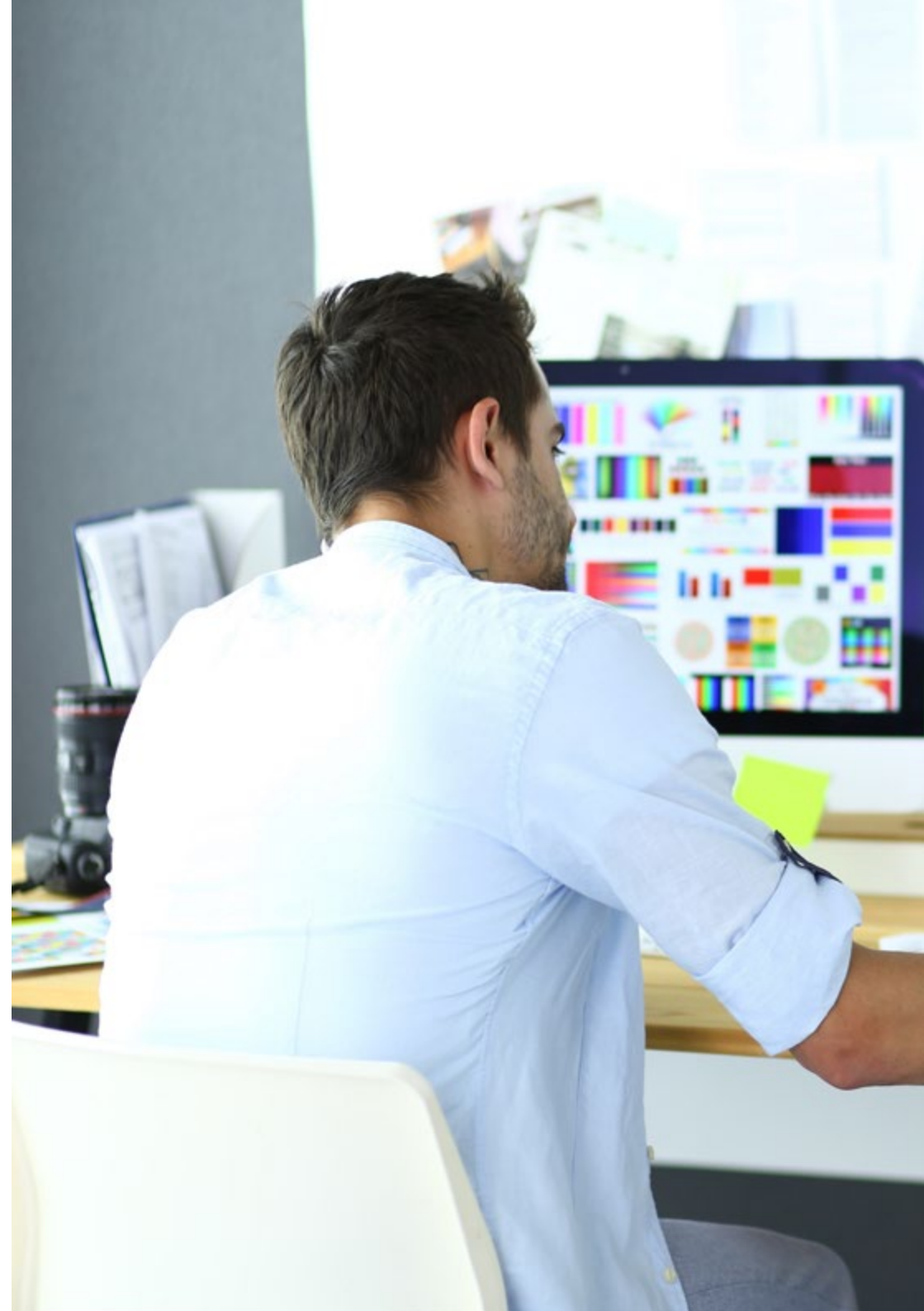
TRACCIÓN | ADICIÓN

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*We have the most complete and up-to-date academic program in the market. We strive for excellence and for you to achieve it too"*

## Module 1. Computer Graphics and Visualization

- 1.1. Color Theory
  - 1.1.1. Properties of Light
  - 1.1.2. Color Models
  - 1.1.3. The CIE Standard
  - 1.1.4. *Profiling*
- 1.2. Output Primitives
  - 1.2.1. The Video Driver
  - 1.2.2. Line Drawing Algorithms
  - 1.2.3. Circle Drawing Algorithms
  - 1.2.4. Filling Algorithms
- 1.3. 2D Transformations and 2D Coordinate Systems and 2D Clipping
  - 1.3.1. Basic Geometric Transformations
  - 1.3.2. Homogeneous Coordinates
  - 1.3.3. Inverse Transformation
  - 1.3.4. Composition of Transformations
  - 1.3.5. Other Transformations
  - 1.3.6. Coordinate Change
  - 1.3.7. 2D Coordinate Systems
  - 1.3.8. Coordinate Change
  - 1.3.9. Standardization
  - 1.3.10. Trimming Algorithms
- 1.4. 3D Transformations
  - 1.4.1. Translation
  - 1.4.2. Rotation
  - 1.4.3. Scaling
  - 1.4.4. Reflection
  - 1.4.5. Shearing
- 1.5. Display and Change of 3D Coordinates
  - 1.5.1. 3D Coordinate Systems
  - 1.5.2. Visualization
  - 1.5.3. Coordinate Change
  - 1.5.4. Projection and Normalization





- 1.6. 3D Projection and Clipping
  - 1.6.1. Orthogonal Projection
  - 1.6.2. Oblique Parallel Projection
  - 1.6.3. Perspective Projection
  - 1.6.4. 3D Clipping Algorithms
- 1.7. Hidden Surface Removal
  - 1.7.1. *Back-Face Removal*
  - 1.7.2. Z-Buffer
  - 1.7.3. Painter Algorithm
  - 1.7.4. Warnock Algorithm
  - 1.7.5. Hidden Line Detection
- 1.8. Interpolation and Parametric Curves
  - 1.8.1. Interpolation and Polynomial Approximation
  - 1.8.2. Parametric Representation
  - 1.8.3. Lagrange Polynomial
  - 1.8.4. Natural Cubic Splines
  - 1.8.5. Basic Functions
  - 1.8.6. Matrix Representation
- 1.9. Bézier Curves
  - 1.9.1. Algebraic Construction
  - 1.9.2. Matrix Form
  - 1.9.3. Composition
  - 1.9.4. Geometric Construction
  - 1.9.5. Drawing Algorithm
- 1.10. *B-Splines*
  - 1.10.1. The Local Control Problem
  - 1.10.2. Uniform Cubic *B-Splines*
  - 1.10.3. Basis Functions and Control Points
  - 1.10.4. Derivative to the Origin and Multiplicity
  - 1.10.5. Matrix Representation
  - 1.10.6. Non-Uniform *B-Splines*

# 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.





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*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 Information Technology 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. Throughout the course, students 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 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 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.



# 05 Certificate

The Postgraduate Certificate in Computer Graphics and Visualization guarantees you, in addition to the most rigorous and updated training, access to a Executive Master's Degree issued by TECH Global University.





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*Successfully complete this program and receive your Postgraduate Certificate without having to travel or fill out laborious paperwork"*

This program will allow you to obtain your **Postgraduate Certificate in Computer Graphics and Visualization** 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.

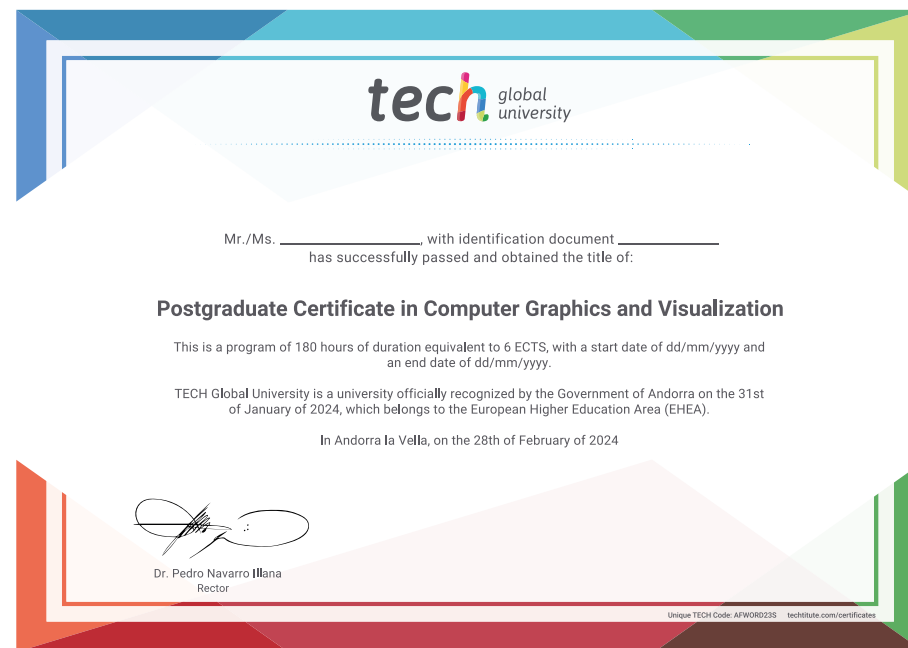
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Certificate in Computer Graphics and Visualization**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**





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