Postgraduate Certificate
Computer Vision

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Computer Vision

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

Website: **www.techtitute.com/us/engineering/postgraduate-certificate/computer-vision**

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01

Introduction

Not surprisingly, some experts concluded that they could use the characteristics of human vision to develop a new technology known as *Computer Vision*. There is currently great optimism among the scientific community regarding its future, since the main benefit of this technology is the high precision with which it can replace human vision. This 100% online qualification enables graduates to analyze how a computer is able to identify an object and each of the steps it takes to do so. In this way, graduating engineers will use *Computer Vision* to assist people and help them do their jobs better, through faster and simpler processes.

This Postgraduate Certificate explores the concept of Computer Vision, its importance and its applications in Engineering"

Computer Vision is commonly used to accelerate real-time analysis of satellite imagery. As a form of artificial intelligence, it can classify, identify, verify and detect objects. This technology enables machines to visually interpret the world around them, so this Postgraduate Certificate analyzes the main use cases that exist for computer vision, in order to know the commercial uses of Computer Vision and where to apply the different models that are presented.

Training a model from scratch implies having a large amount of information previously catalogued, which requires hours to achieve good results. In many cases, it is possible to start from models previously trained by *Transfer Learning*. This Postgraduate Certificate examines what network models are currently available to facilitate the training of a model applying this technique.

In addition, students have the best study methodology 100% online, which eliminates the need to attend classes in person or to follow a predetermined schedule. In this way, in just 6 weeks they will deepen their understanding of the scope of application of *Computer Vision*, understanding the competitive advantages it brings, so they will be positioned at the technological forefront and will be able to lead ambitious projects in the present and in the future.

This **Postgraduate Certificate in Computer Vision** contains the most complete and up-to-date program on the market. The most important features include:

- Case studies presented by experts in *Computing Vision*
- 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
- 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

Computer Vision has a market that is growing exponentially and is breaking into all types of commercial industries. Seize your chance"

This technology has become an important driver of Artificial Intelligence. Update your knowledge by taking this qualification"

This discipline has been booming in recent years thanks to the development of new complementary technologies.

Computer vision will be useful for automating tasks such as defect detection, quality control, predictive maintenance and remote measurement.

The program includes, in its teaching staff, professionals from the sector who bring to this program the experience of their work, in addition to recognized specialists from prestigious reference societies and 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 course. For this purpose, students will be assisted by an innovative interactive video system created by renowned and experienced experts.

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Objectives

With the objective of providing an overview of current and possible future applications in organizations, this Postgraduate Certificate provides a technical immersion in *Computer Vision*, one of today's most relevant technologies. The direct application of the knowledge acquired about this disruptive technology in real projects is an added professional value that very few engineers can offer, so the possibilities for professional growth of the students of this qualification are immense.

It employs this technique in industries such as manufacturing, e-commerce, agriculture, automotive and medical"

General Objectives

- Analyze how a computer is capable of identifying image
- Determine how the convolution layer works and how *Transfer Learning* works
- Identify the different types of algorithms mainly used in Computer Vision

This program will generate in you specialized knowledge so that you will become a catalyst engineer of the technologies of the future"

Specific Objectives

- Analyze what Computer Vision is
- Determine typical computer vision tasks
- Analyze, step by step, how convolution works and how transfer learning works *Transfer Learning*
- Identify what mechanisms we have available to create modified images, from original to have more training data
- Compile typical tasks that can be performed with computer vision
- Examine commercial computer vision use cases

03

Course Management

Professionals with years of experience in the field of Computer Vision come together in this Postgraduate Certificate to teach the graduate to understand the importance and effects of the integration of this technology in the different areas of engineering in order to allow the automation of exhaustive or repetitive processes that require cognitive capabilities, i.e., intelligent automation.

Computer Vision is considered part of information engineering, get trained by the best professionals in the industry"

Management

Mr. Molina Molina, Jerónimo

- Head of Artificial Intelligence at Helphone
- AI Engineer & Software Architect at NASSAT, Internet Satellite in Motion
- Senior Consultant at Hexa Engineer
- Artificial Intelligence Introducer (ML and CV)
- Expert in Artificial Intelligence Based Solutions in the fields of Computer Vision, ML/DL and NLP
- Postgraduate Diploma in Business Creation and Development at Bancaixa and Fundeun
- Computer Engineer by the University of Alicante
- Professional Master's Degree in Artificial Intelligence from the Catholic University of Avila
- MBA Executive at the European Business Campus Forum

Professors

Mr. Pi Morell, Oriol

- Functional Analyst at Fihoca
- Hosting and Mail Product Owner at CDmon
- Functional Analyst and Software Engineer at Atmira and Capgemini
- Teacher at Capgemini, Forms Capgemini and Atmira
- Degree in Technical Engineering in Computer Management from the Autonomous University of Barcelona
- Master's Degree in Artificial Intelligence from the Catholic University of Avila
- MBA in Business Management and Administration from IMF Smart Education
- Professional Master's Degree in Information Systems Management from IMF Smart Education
- Postgraduate degree in Design Patterns from the Universitat Oberta de Catalunya (Open University of Catalonia)

04

Structure and Content

This program brings together in one module specialized knowledge in the different options offered by *Computer Vision* for the industry. It also develops the different options currently available on the market, and delves into the global structure of a model by applying the *Transfer Learning* technique. All this, from a practical and innovative business perspective so that engineers can apply it directly to the successful completion of their studies. apply it directly to the successful completion of their studies.

From an engineering perspective, it seeks to automate tasks that can be performed by the human visual system"

Module 1. R&D and AI Computer Vision Object Identification and Tracking

1.1. Computer Vision
- 1.1.1. *Computer Vision*
- 1.1.2. Computational Vision
- 1.1.3. Interpretation of the Machines in an Image

1.2. Activation Functions
- 1.2.1. Activation Functions
- 1.2.2. Sigmoid
- 1.2.3. RELU
- 1.2.4. Hyperbolic Tangent
- 1.2.5. Softmax

1.3. Construction of Convolutional Neural Networks
- 1.3.1. Convolution Operation
- 1.3.2. ReLU Layer
- 1.3.3. *Pooling*
- 1.3.4. *Flattering*
- 1.3.5. *Full Connection*

1.4. Convolution Process
- 1.4.1. Operation of a Convolution
- 1.4.2. Convolution Code
- 1.4.3. Convolution. Application

1.5. Transformations with Images
- 1.5.1. Transformations with Images
- 1.5.2. Advanced Transformations
- 1.5.3. Transformations with Images. Application
- 1.5.4. Transformations with Images. *Use Case*

1.6. *Transfer Learning*
- 1.6.1. *Transfer Learning*
- 1.6.2. *Transfer Learning* Typology
- 1.6.3. Deep Networks to Apply *Transfer Learning*

1.7. Computer Vision *Use Case*
- 1.7.1. Image Classification
- 1.7.2. Object Detection
- 1.7.3. Object Identification
- 1.7.4. Object Segmentation

1.8. Object Detection
- 1.8.1. Convolution-Based Detection
- 1.8.2. R-CNN, Selective Search
- 1.8.3. Rapid Detection with YOLO
- 1.8.4. Other Possible Solutions

1.9. GAN. Antagonistic generative networks, or *Generative Adversarial Networks*
- 1.9.1. Generative Adversarial Networks
- 1.9.2. Code for a GAN
- 1.9.3. GAN. Application

1.10. Application of *Computer Vision* Models
- 1.10.1. Content Organization
- 1.10.2. Visual Search Engines
- 1.10.3. Facial Recognition
- 1.10.4. Augmented Reality
- 1.10.5. Autonomous Driving
- 1.10.6. Fault Identification in Each Assembly
- 1.10.7. Pest Identification
- 1.10.8. Health

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.

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 that you are presented with 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

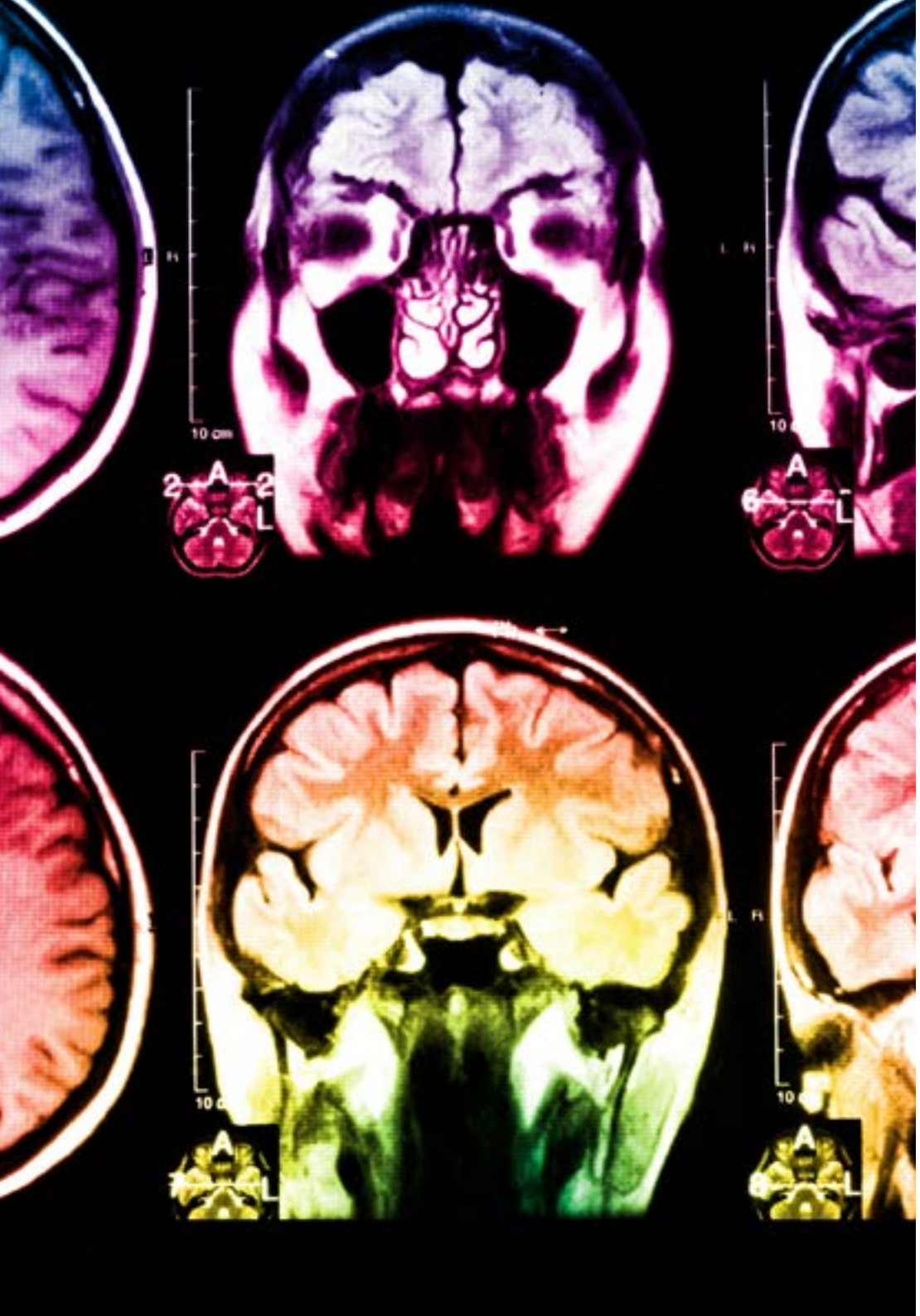
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

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. 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.

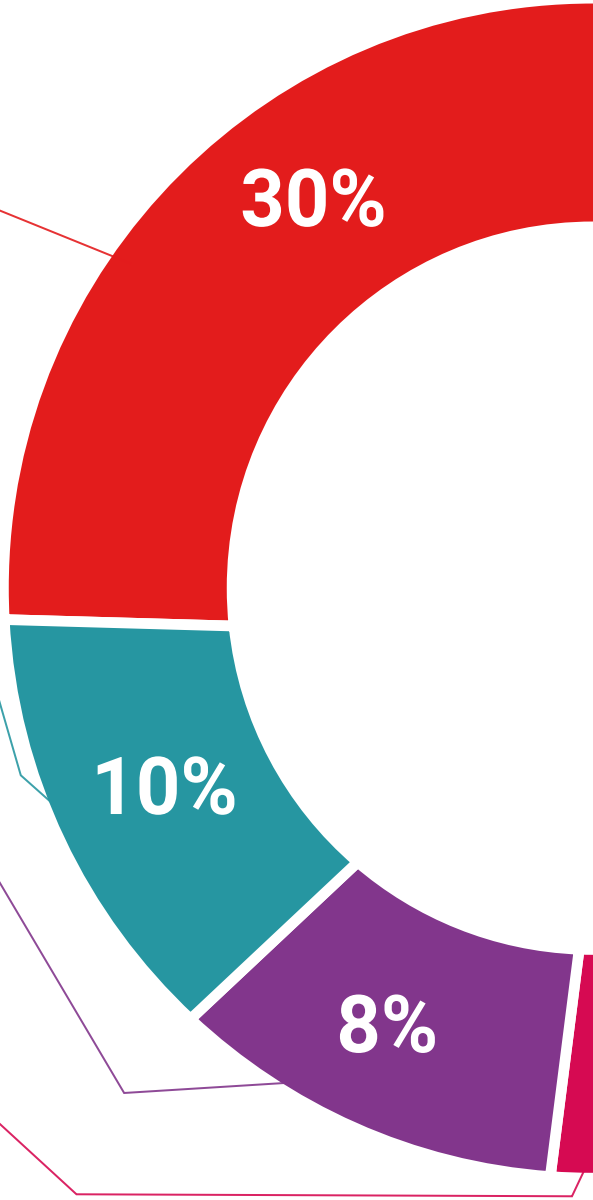
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

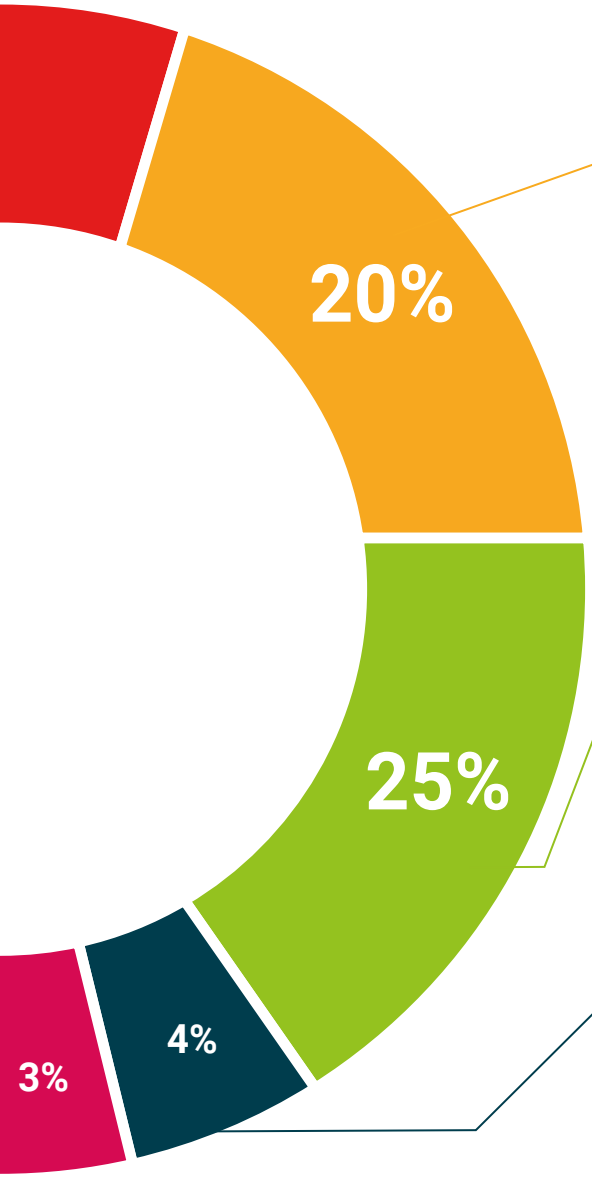
Practising Skills and Abilities

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.

06

Certificate

The Postgraduate Certificate in Computer Vision 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 Computer Vision** 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 Vision**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**


tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Postgraduate Certificate in Computer Vision

This is a program of 150 hours of duration equivalent to 6 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates

*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.

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