Postgraduate Certificate
Advanced Digital Image Processing in Computer Vision

tech global university

Postgraduate Certificate
Advanced Digital Image Processing in Computer Vision

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

Website: **www.techtitute.com/in/artificial-intelligence/postgraduate-certificate/advanced-digital-image-processing-computer-vision**

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01
Introduction

Digital Image Processing is a method used in the field of Machine Vision that allows devices to capture, process and analyze images to extract valuable information. Therefore, most companies use it to improve security both in the work environment and in their respective facilities. For example, this is especially useful in the surveillance industry to detect instructions, perform facial recognition for access control or remotely monitor sensitive areas. Faced with the growing demand for this professional profile, TECH implements university and 100% online learning for specialists to keep them at the forefront of the most advanced techniques of Facial Landmark Detection.

You will apply to your projects the Fourier Analysis to decompose images into their spatial frequency components, thanks to this 100% online program"

Artificial Intelligence has become the backbone of Industry 4.0, completely revolutionizing manufacturing processes in different companies. In this context, Computer Vision allows machines to understand the visual content of their environment, extracting meaningful information and making optimal decisions based on this data. These procedures are opening the door to a wide range of applications, ranging from medicine to automotive or agriculture. As a result, more and more people are choosing to specialize in this sector to work on projects that have a direct and positive impact on society.

In response to this demand, TECH has designed a Postgraduate Certificate that will lay the foundations in Advanced Image Processing. Designed by experts in the field, the academic itinerary will focus on Computer Vision, with the objective that students digitally process images taking into account aspects such as the relationships between pixels, transformations from histograms and morphological operations. Along the same lines, the syllabus will highlight the importance of optical character recognition for efficient processing of large volumes of text. Likewise, the didactic materials will provide students with the most innovative techniques for the use of dynamic applications, among which High Dinamic Range and Photometric Stereo. stand out.

The Postgraduate Certificate format is based on the advanced Relearningteaching methodology, of which TECH is a pioneer. This is based on the natural reiteration of key concepts, promoting that students enjoy a progressive and natural learning. In addition, in the Virtual Campus students will have access to a library full of multimedia resources (including infographics, interactive summaries and case studies) to dynamically reinforce the most complex terms.

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

- The development of case studies presented by experts in computer science and computer vision

- The graphic, schematic and practical contents of the book provide scientific and practical information on those 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

You will fully master the technique of High Dynamic Range, to improve the quality of images in high contrast situations and object detection"

Through TECH's revolutionary Relearning system, you will acquire knowledge progressively without the need to memorize.

The program will include the analysis of real case studies, which will take you completely into the reality of the demanding labor market.

" *Specialize in Digital Image Processing for Machine Vision and make the leap into a wide range of booming industries such as automotive or manufacturing"*
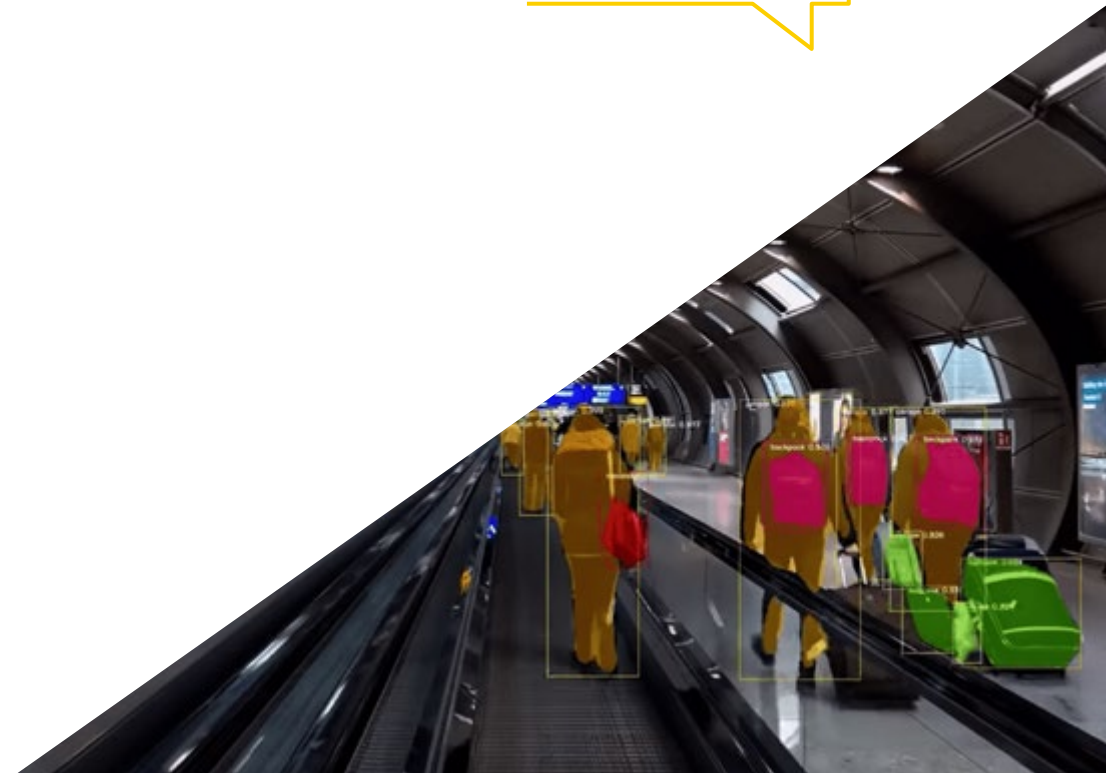
The program's teaching staff includes professionals from the industry who contribute their work experience to this program, as well as renowned specialists from leading societies and prestigious universities.

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.

02

Objectives

Through 360 teaching hours, graduates will be provided with the best tools related to Advanced Digital Image Processing in Computer Vision. This will allow them to perform their work effectively, applying the latest trends that have occurred in this subfield of Artificial Intelligence. It should be noted that they will have the most innovative resources to successfully overcome any obstacle that arises during the performance of their professional duties.

"
Efficiently update all your knowledge in Advanced Image Processing in Computer Vision and achieve a distinctive quality boost in your professional career"

General Objectives

- Analyze advanced image processing techniques
- Develop tools that combine different computer vision techniques.
- Demonstrate how functional solutions can be created to address industrial, commercial, and other problems
- Establish a solid foundation in the understanding of digital image processing algorithms and techniques
- Examine filtering algorithms, morphology, pixel modification, etc.
- Assess fundamental computer vision techniques

You will acquire advanced skills that will enable you to effectively handle state-of-the-art Image Calibration Methods"

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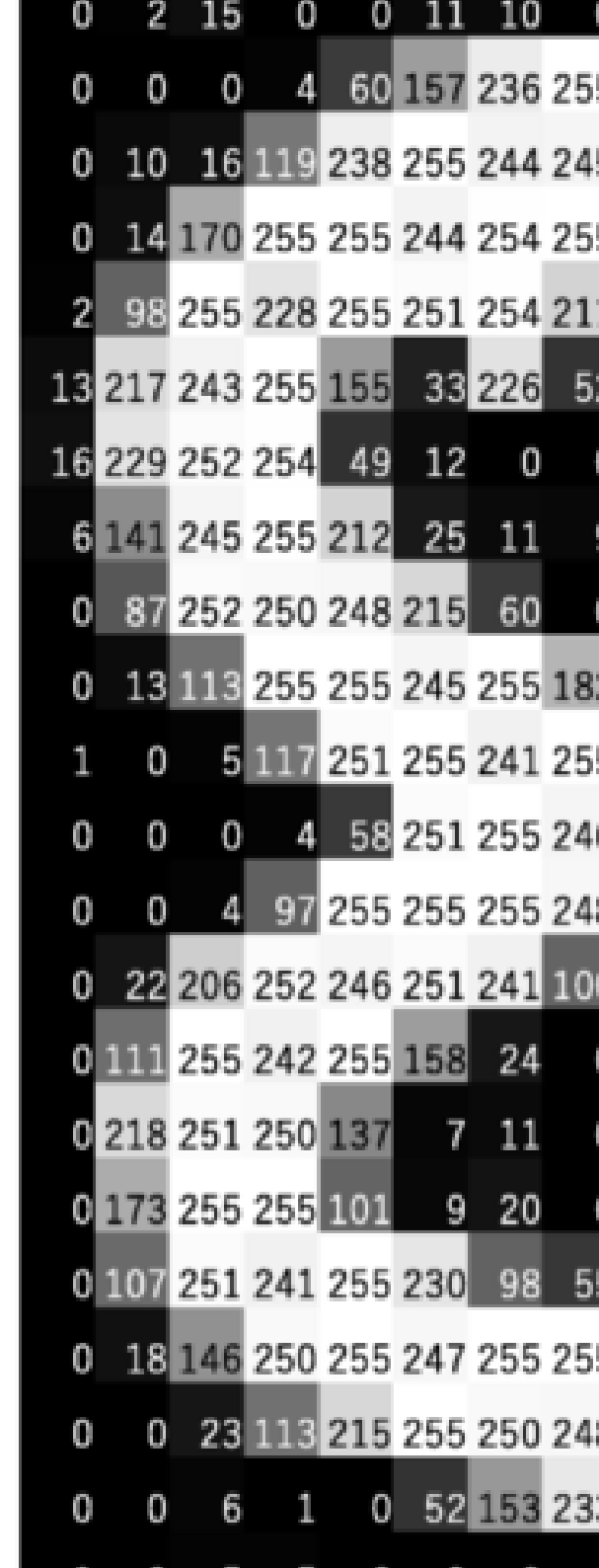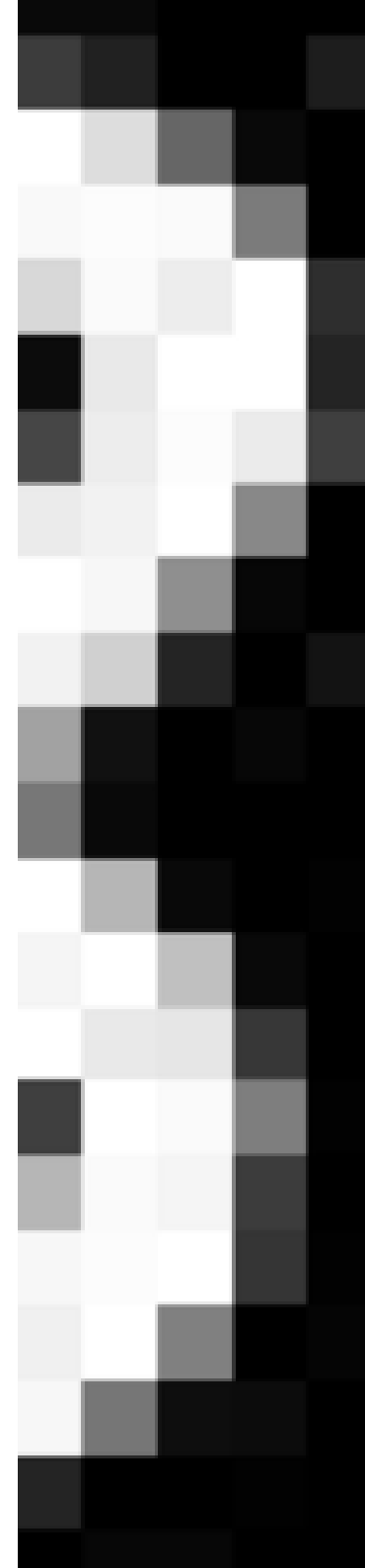
Specific Objectives

- Examine commercial and open-source digital image processing libraries
- Determine what a digital image is and evaluate the fundamental operations to be able to work with them
- Applying image filters
- Present tools to modify images pixel by pixel
- Propose image segmentation tools
- Analyze morphological operations and their applications
- Determine the methodology in image calibration
- Evaluate methods for segmenting images with conventional vision
- Examine advanced digital image processing filters
- Determine contour extraction and analysis tools
- Analyze object search algorithms
- Analyze mathematical techniques for geometry analysis
- Evaluate different options in image compositing
- Develop user Interface

03
Course Management

To provide educational excellence, TECH offers students a teaching staff made up of true experts in Digital Image Processing. These professionals have a broad professional background in the field of Artificial Intelligence, being highly specialized in Computer Vision. In addition, they are at the forefront of the latest advances in Artificial Intelligence, they remain at the forefront of the advances in this field to offer services based on the highest quality. In this way, students of this Postgraduate Certificate will have access to the most complete and up to date didactic materials on the market, which will lead them to experience a leap in quality in their profession.

Update your knowledge in Advanced Digital Image Processing from the hand of professionals with years of experience in the Computer Vision sector"

Management

Mr. Redondo Cabanillas, Sergio

- Machine Vision Research and Development Specialist at BCN Vision
- Development and *Backoffice* Team Leader at BCN Vision
- Project Manager and development of computer vision solutions.
- Sound Technician at Media Arts Studio
- Specialization in Image and Sound by the Polytechnic University of Catalonia.
- Graduate in Political Science and Industry from the Autonomous University of Barcelona.
- Higher Level Training Cycle in Sound Villar CP

Professors

Mr. Enrich Llopart, Jordi
- Chief Technology Officer of Bcnvision - Machine Vision
- Project and application engineer. Bcnvision - Machine Vision
- Project and application engineer. PICVISA Machine Vision
- Graduated in Telecommunications Technical Engineering. Specialization in Image and Sound by the University School of Engineering of Terrassa (EET) / Polytechnic University of Catalonia (UPC)
- MPM - Master in Project Management. La Salle University - Ramon Llull University

Mr. Bigata Casademunt, Antoni
- Perception Engineer at Computer Vision Center (CVC)
- Machine Learning Engineer at Visium SA, Switzerland
- Degree in Microtechnology from Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland
- Master's degree in Robotics from the Ecole Polytechnique Fédérale de Lausanne (EPFL)

Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice"

Structure and Content

This program will equip professionals with state-of-the-art procedures and instruments for Advanced Digital Image Processing in Computer Vision. To this end, the program will delve into key aspects ranging from geometric transformations to logical and arithmetic operations. Students will also examine the different methods of calibrating visual resources to obtain accurate measurements. In addition, the syllabus will address the technique of optical character recognition, as well as the search for patterns and tracking of objects with conventional vision. In this way, graduates will develop projects in a wide range of applications in fields such as security.

You will enrich your daily practice with the most innovative tools for Image Analysis, through this program of only 12 weeks"

Module 1. Digital Image Processing

1.1. Computer Vision Development Environment
    1.1.1. Computer Vision Libraries
    1.1.2. Programming Environment
    1.1.3. Visualization Tools
1.2. Digital image Processing
    1.2.1. Relationships Between Pixels
    1.2.2. Image Operations
    1.2.3. Geometric Transformations
1.3. Pixel Operations
    1.3.1. Histogram
    1.3.2. Histogram Transformations
    1.3.3. Operations on Color Images
1.4. Logical and Arithmetic Operations
    1.4.1. Addition and Subtraction
    1.4.2. Product and Division
    1.4.3. And/Nand
    1.4.4. Or/Nor
    1.4.5. Xor/Xnor
1.5. Filters
    1.5.1. Masks and Convolution
    1.5.2. Linear Filtering
    1.5.3. Non-Linear Filtering
    1.5.4. Fourier Analysis
1.6. Morphological Operations
    1.6.1. Erosion and Dilation
    1.6.2. Closing and Opening
    1.6.3. Top_hat and Black hat
    1.6.4. Contour Detection
    1.6.5. Skeleton
    1.6.6. Hole Filling
    1.6.7. Convex Hull

Module 2. Advanced Digital Image Processing

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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.
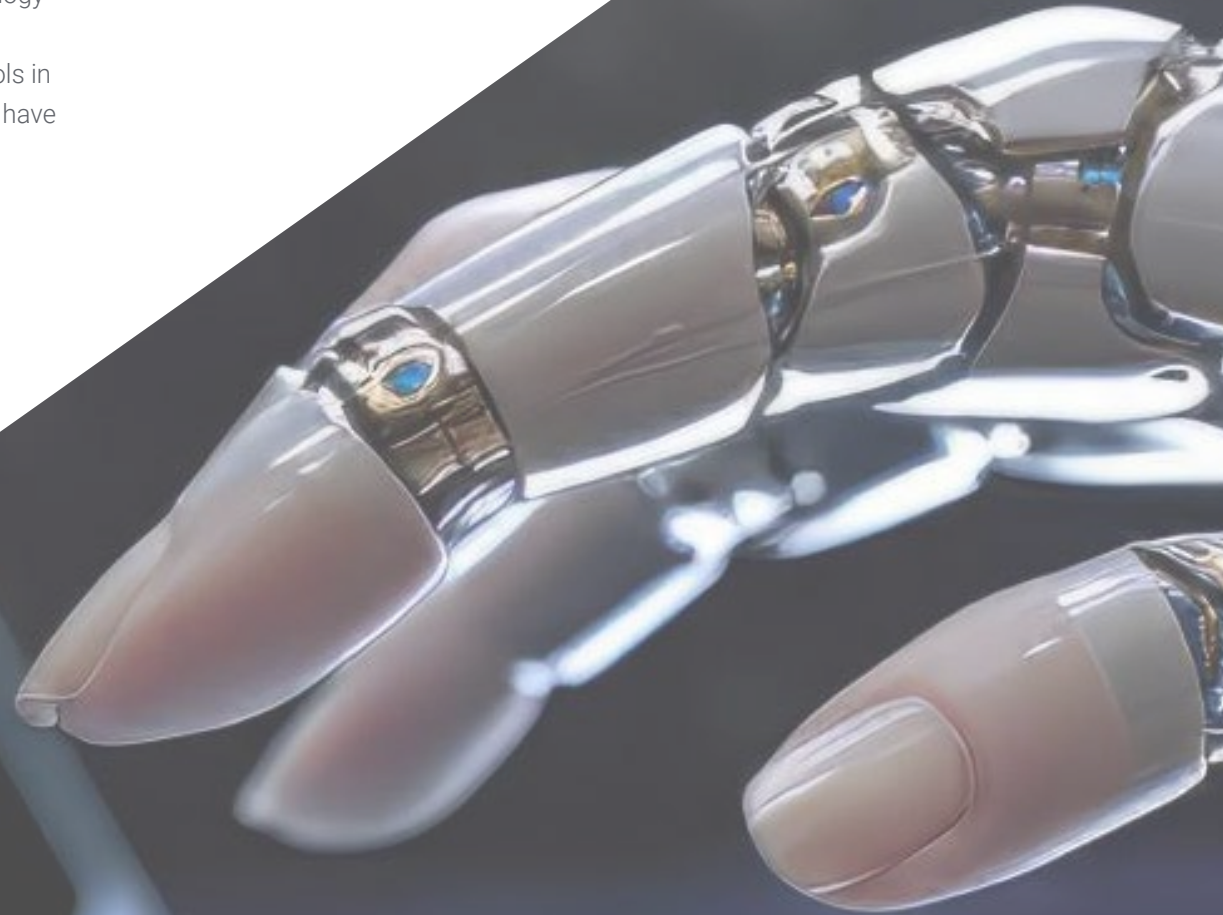
" *Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

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 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.

01 learning from evidence

02 relearning from evidence

03 testing

04 learning from an expert

05 neurocognitive context dependent learning

06 Von-Restorff effect

07 case based learning through storytelling

08 competencies testing (retesting)

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.

30%

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.

10%

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.

8%

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.

20%

25%

4%

3%
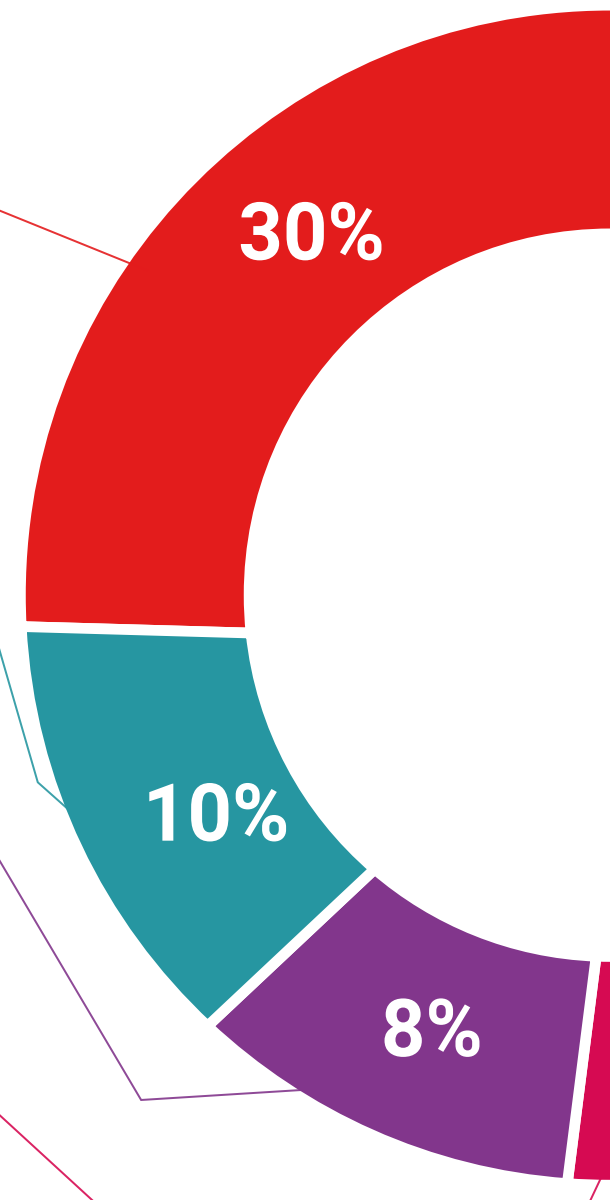
Case Studies

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 Advanced Digital Image Processing 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 Advanced Digital Image Processing in Computer** 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 Advanced Digital Image Processing in Computer**

Modality: **online**

Duration: **12 weeks**

Accreditation: **12 ECTS**

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

Postgraduate Certificate in Advanced Digital Image Processing in Computer

This is a program of 360 hours of duration equivalent to 12 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

Unique TECH Code: AFWORD23S   techtitute.com/certificates

*Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

![TECH global university logo]

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